

PROVIDENCE
VA MEDICAL CENTER
830 CHALKSTONE AVENUE
PROVIDENCE, RI 02908

FCA LOBBY AND CORRIDOR RENOVATIONS



ISSUED FOR CONSTRUCTION DOCUMENTS

VA PROJECT NO. 650-08-104

DATE: 08/12/11

DEPARTMENT OF VETERANS AFFAIRS

MASTER SPECIFICATIONS

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**SECTION 01 00 00
GENERAL REQUIREMENTS**

1.1 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition and removal of portion of existing structures, and furnish labor and materials and perform work for FCA Renovation of Lobbies and Corridors, Veterans Affairs Medical Center, Providence, Rhode Island as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Medical Center Engineering Officer.
- C. Offices of Payette Associates, Inc., as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. 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.
- E. 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.
- F. Training:
 - 1. All employees of general contractor or subcontractors shall have at a minimum completed the 10-hour OSHA certified Construction Safety course and other relevant competency training, as determined by VA CP with input from the ICRA team and Construction Safety Committee of the Medical Center.
 - 2. Submit training records of all such employees for approval before the start of work.

1.2 STATEMENT OF BID ITEM(S)

- A. ITEM I, GENERAL CONSTRUCTION: FCA Renovation of Lobbies and Corridors: Work includes general construction, alterations, electrical work, equipment,, necessary removal of portions of existing construction and certain other items.
- B. Refer to Section 01 23 00, ALTERNATES for schedule of bid alternates.
- C. Refer to Section 01 22 00, UNIT PRICES for schedule of unit prices.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. AFTER AWARD OF CONTRACT, contract documents will be furnished electronically as a single CD-ROM with portable document format (PDF) files.

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- B. Additional hard-copy sets of drawings may be made by the Contractor, at Contractor's expense, from the CD-ROM furnished by the Contracting Officer.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

- 1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
- 2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

- 1. All Contractor personnel shall obtain a short-term identification badge issued by the Project Manager. Such badge shall be worn by the individual and prominently displayed at all times while on VA property. No Contractor personnel shall enter the project site without a valid identification badge issued by the VA. In order to obtain a short-term identification badge, Contractor personnel shall present to the Project Manager a valid (non-expired) photo identification issued by a US federal, state, or local government agency. All Contractor personnel are subject to inspection of 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 obtain approval of the Contracting Officer so that security and escort 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 Resident Engineer for the purpose of security inspections of every area of project including tool boxes and parked machines and for the purpose of taking any emergency action.

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.

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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.
 - a. Parking of construction equipment necessary to perform the work is subject to approval by Contracting Officer. Request approval prior to starting the Project.
2. Separate limited number of permits shall be issued for General Contractor and its employees for parking in designated areas only. Permits may be issued for a limited number of Contractor personnel and for limited time periods.
3. Contractors shall post permits on the window of vehicles. If requested by Contracting Officer, Contractors shall post the contractor name and project title on the window with an 8.5 x 11 inch sheet of paper.
4. Parking in patient, physician, VA staff, or other restricted parking areas is strictly prohibited. The contractor will not be allowed to park in unauthorized areas.
5. Contractors shall not park on grass areas.
6. Contractors found parking in unauthorized areas shall be subject to ticketing by the VA Police.
7. Subject to approval of Contracting Officer, non-reserved parking available to Contractors is limited to areas as indicated in GENERAL REQUIREMENTS – SUPPLEMENT.

1.5 FIRE SAFETY

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

1. American Society for Testing and Materials (ASTM):
E84-10b Surface Burning Characteristics of Building Materials
2. National Fire Protection Association (NFPA):
10-10..... Standard for Portable Fire Extinguishers
30-08..... Flammable and Combustible Liquids Code

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- 51B-09 Standard for Fire Prevention During Welding, Cutting and Other Hot Work
 - 70-11 National Electrical Code
 - 241-09 Standard for Safeguarding Construction, Alteration, and Demolition Operations
3. Occupational Safety and Health Administration (OSHA):
- 29 CFR 1926 Safety and Health Regulations for Construction
- B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Resident Engineer and Facility Safety Officer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposed overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:
- 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas, the areas that are described in phasing requirements, and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one-hour or two-hour fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures. Where there is no indication on Drawings, provide two-hour fire-rated temporary construction partitions.
 - 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.
 - 4. Fire rated and smoke rated construction shall be maintained intact during construction. Penetrations and openings shall not be left open temporarily.
 - 5. Where there is no indication of temporary construction partition locations on Drawings, provide temporary construction partitions at perimeter of construction areas where adjoining occupied areas. Verify locations with Resident Engineer. Comply with requirements for fire safety, infection control, security, and other specified requirements.

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- F. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Resident Engineer and Safety Officer.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Resident Engineer and Safety Officer.
- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Standpipes: Maintain access to existing standpipes.
- L. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- M. 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 Resident Engineer and facility Safety Officer. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- N. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Comply with Medical Center procedures for preventing false fire alarms as indicated in GENERAL REQUIREMENTS – SUPPLEMENT.
- O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Resident Engineer. Obtain permits from facility Safety Officer at least 48 hours in advance. In addition to permits obtained from VA, Contractor shall maintain their own hot work permit system in accordance with OSHA regulations.
- P. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Resident Engineer and facility Safety Officer.
- Q. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking areas.
- R. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily and as indicated in Section 01 74 19, CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
- S. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

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- T. Contractor shall provide necessary signage and make necessary changes to EXIT signage as required to ensure egress and safety.

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 performance of 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.

(FAR 52.236-10)

- D. Working space and space available for storing materials and equipment shall be as determined by the Resident Engineer.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
- G. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Resident Engineer where required by limited working space.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
 - 3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.
 - 4. VA reserves the right to require Contractor to stop or temporarily stop disruptive work where such work interferes with normal functioning of Medical Center.

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- H. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer. All such actions shall be coordinated with the Utility Company involved:
 - 1. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
 - 2. Terminate and cap utility services at point of service connection.
- I. Work under Separate Contracts: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- J. Phasing: To insure such executions, Contractor shall furnish the Resident Engineer with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the Resident Engineer two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Medical Center Director, Resident Engineer and Contractor, as follows:
- K. Phases: Refer to Drawings for phasing requirements.
- L. Existing Building(s) will be occupied during performance of work; but immediate areas of alterations will be vacated.
 - 1. 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. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
- M. When a building or building area is turned over to Contractor, Contractor shall accept entire responsibility therefore.
 - 1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
 - a. Maintain typical Medical Center temperature settings in renovation areas.
 - 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 Safety Section, Fire Department or Company (Department of Veterans Affairs or municipal), and VA Police (Department of Veterans Affairs) which will be required to respond to an alarm from Contractor's employee or watchman.
- N. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure

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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 Resident Engineer.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Resident Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval. Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS for additional requirements.
2. Contractor shall submit a request to interrupt any such services to Resident Engineer, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer.
5. In case of a contract construction emergency, service will be interrupted on approval of Resident Engineer. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

O. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

P. 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.

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

1.7 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Resident Engineer, of areas of buildings in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the Contracting Officer. This report shall list by rooms and spaces:

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1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of buildings.
 2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
 3. Shall note any discrepancies between drawings and existing conditions at site.
 4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Resident Engineer.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be non-existent, or in opinion of Resident Engineer or Supply Representative, 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 Resident Engineer together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
 2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
 3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 INFECTION PREVENTION MEASURES

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. The Contractor shall monitor dust in the vicinity of the construction work and the Contractor shall take corrective action immediately if exceeding the required safe levels. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded. Refer to Section 01 56 10, DUST AND AIRBORNE CONTAMINANTS CONTROL for additional information.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group and as specified in the contract documents. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Resident Engineer and

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Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
 2. All personnel shall show evidence of TB screening to ensure that personnel do not have nor carry TB.
 3. All personnel shall fill out the Healthcare Questionnaire form supplied by the Contracting Officer at the pre-construction conference.
- C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) and airborne particulates as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. . A baseline of conditions shall be established by the contractor prior to the start of work and weekly during the construction stage to determine impact of construction activities on indoor air quality. Contractor shall provide particulate monitors with a range of 0.001 to 10 mg/m³ with a resolution of 0.001 mg/m³ and 0.01 to 100 mg/m³. Data logger shall have a digital read out and have the capability for extracting data for reports to be provided weekly showing hourly readings with high alarm out puts. Reports shall include daily pressure readings and particulate reports to insure compliance to maintaining a proper negative pressure and dust barrier throughout the entire project. In addition:
1. The RE and VAMC Infection Control personnel will review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.
 2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.
- D. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Resident Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction. The method of capping ducts shall be dust tight and withstand airflow.
 2. Do not perform dust producing tasks within occupied areas without the approval of the Resident Engineer. For construction in any areas that will remain jointly occupied by the medical Center and Contractor's workers, the Contractor shall obtain an infection control permit before beginning construction in an area. Contractor shall:
 - a. Provide dust proof one-hour or two-hour fire-rated temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Barriers shall be sealed and made presentable on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Maintain negative air at all times. A fire retardant polyethylene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center.

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- b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other pre-filter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.
- c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
- d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as they are created. Transport these outside the construction area in containers with tightly fitting lids.
- e. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
- f. Using a HEPA vacuum, clean inside the barrier and vacuum ceiling tile prior to replacement. Any ceiling access panels opened for investigation beyond sealed areas shall be sealed immediately when unattended.
- g. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
- h. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.
- i. Seal holes, pipes, conduits and penetrations appropriately to maintain negative pressure and dust containment.
- j. Construct anteroom vestibules at entrance to each construction area. Where construction personnel pass through occupied areas for entrance or exit access, require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving the work site or the workers shall wear paper overalls that are removed each time they leave the work site.
- k. Wet mop area with disinfectant and wipe surfaces with disinfectant prior to release of area. Appropriate disinfectants include a dilution of bleach solution and or a EPA registered tuberculocides (list B), products registered by EPA (List A), products registered against HIV/HBV (List D)." As extracted from the Blood born Pathogen standard and by reference in CPL-02-02-069-CLP2-2-.69 Enforcement Procedures for the standard.
- l. Do not remove barriers from select areas until the complete area is cleaned by VA Environmental Management Services. Coordinate with Resident Engineer.

E. Final Cleanup:

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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, but is not limited to, walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
3. All new air ducts shall be cleaned prior to final inspection.

1.9 DISPOSAL AND RETENTION

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

1. Reserved items which are to remain property of the Government are identified by attached tags 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 Resident Engineer.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. PCB Transformers, Capacitors, and lighting ballasts : The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers capacitors, and lighting ballasts. The transformers, capacitors, and lighting ballasts 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, capacitors, and lighting ballasts for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's Chief.

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

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

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

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

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

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

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

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

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(FAR 52.236-9)

- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.11 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone)

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which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.12 LAYOUT OF WORK

- A. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to existing construction or other portions of the Work, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
 - 1. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for clarification to Resident Engineer.
- D. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing construction. If discrepancies are discovered, notify Resident Engineer promptly.
- E. Lay out the Work using accepted engineering practices.
 - 1. Establish benchmarks and control points to set lines at each floor level of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Resident Engineer when deviations from required lines and levels exceed allowable tolerances.
- F. Building Lines and Levels: Locate and lay out control lines, column grids, and other reference points including those required for mechanical and electrical work.
- G. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.

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- H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- I. Anchors and Fasteners: Provide blocking and attachment plates and anchors and fasteners of adequate size and number as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Resident Engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
- J. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- K. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Resident Engineer.

1.13 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which shall be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.14 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property.

1.15 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:
 - 1. Permission to use each unit or system must be given by Resident Engineer. If the equipment is not installed and maintained in accordance with the following provisions, the Resident Engineer will withdraw permission for use of the equipment.
 - 2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical

systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.

3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
 4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
 5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
 6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

1.16 TEMPORARY USE OF EXISTING ELEVATORS

- A. Use of designated existing service elevator for handling building materials and Contractor's personnel will be permitted subject to following provisions:
1. Contractor makes all arrangements with the Resident Engineer for use of elevators. The Resident Engineer will ascertain that elevators are in proper condition. Contractor may use elevator designated by Resident Engineer for limited temporary use and only for time periods approved in writing by Resident Engineer. Use shall be scheduled with and at the convenience of the Medical Center. Do not use elevator(s) at other than times approved by Resident Engineer. Do not use other existing elevators unless specifically approved in writing by Resident Engineer..
 2. Contractor covers and provides maximum protection of following elevator components:
 - a. Entrance jambs, heads soffits and threshold plates.
 - b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
 - c. Finish flooring.
 3. Contractor is responsible for temporary protection of elevators used by Contractor. Medical Center will not provide elevator operators or other monitoring of elevator use.
 4. Contractor shall not load elevators beyond their rated weight capacity.
 5. Contractor shall provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
 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.

1.17 TEMPORARY TOILETS

- A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Resident Engineer, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.
- B. Contractor shall not use existing VA toilet facilities.

1.18 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.
- C. Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.
- D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
 - 1. Obtain heat by connecting to Medical Center heating distribution system.
 - a. Steam is available at no cost to Contractor.
- E. Electricity (for Construction and Testing): Furnish all temporary electric services.
 - 1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.
- F. Water (for Construction and Testing): Furnish temporary water service.
 - 1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
 - 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at Resident Engineer's discretion) of use of water from Medical Center's system.

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.
- 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 and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Resident Engineer coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.
- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Resident Engineer and shall be

considered concluded only when the Resident Engineer is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.21 GOVERNMENT-FURNISHED PROPERTY

- A. The Government shall deliver to the Contractor, the Government-furnished property shown on the drawings .
- 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 equipment and items indicated by symbol "R" or otherwise shown to be removed, reinstalled, or relocated by the Contractor. Remove and re-install tack boards and other loose wall-mounted items in areas of renovations.
 - 1. Provide temporary protection for items indicated to be removed and reinstalled.

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

1.23 TEMPORARY CONSTRUCTION SIGNS

- A. Provide temporary construction signs as required to comply with requirements and for safety and protection of public, patients, and VA personnel. Signs shall include those required to indicate detours, directional routes, altered access and egress routes, exit locations, areas closed to public, hazards, areas requiring authorized access, restricted areas, safety requirements, and other necessary signs.

1.24 PHOTOGRAPHIC DOCUMENTATION

- A. During the construction period through completion, furnish Department of Veterans Affairs with 170 views of digital images, including one color print of each view and one Compact Disc (CD) per visit containing those views taken on that visit. Digital views shall be taken of exterior and/or interior as selected and directed by Resident Engineer (RE). Each view shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) and the images will be a minimum of 2272 x 1704 pixels for the 200x250mm (8x 10 inch) prints and 2592 x 1944 pixels for the 400x500 mm (16 x 20 inch) prints, as per these specifications:
 - 1. Normally such images will be taken at monthly intervals. However, the Resident Engineer may also direct the taking of special digital images at any time prior to completion and acceptance of contract. If the number of trips to the site exceeds an average of one per month of the contract performance period then an adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
 - 2. In event a greater or lesser number of images than specified above are required by the Resident Engineer, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- B. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.
- C. Prints shall be made on 200 x 250 mm (8 by 10 inch) regular-weight matte archival grade photographic paper and produced by a process with a minimum of 300 pixels per inch (PPI). Prints must be printed using the commercial RA4 process (inkjet prints will not be acceptable).

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Photographs shall have 200 x 200 mm (8 by 8 inch) full picture print with no margin on three sides and a 50 mm (2 inches) margin on the bottom for pre-typed self-adhesive identity label to be added by Resident Engineer. It is required that the prints are professionally processed so the quality will meet or exceed that of the same size print made with a film camera. Prints must be shipped flat to the Resident Engineer:

- D. Images on CD-ROM shall be recorded in JPEG format with a minimum of 24 bit color and no reduction in actual picture size. Compressed size of the file shall be no less than 80% or the original with no loss of information. File names shall contain the date the image was taken, the Project number and a unique sequential identifier. The CD-ROM shall also contain an index of all the images contained therein in either a TXT or Microsoft Word format.
- E. In case any set of prints are not submitted within five days of date established by Resident Engineer for taking thereof, the Resident Engineer may have such images/photographs taken and cost of same will be deducted from any money due to the Contractor.
- F. Interior Final Photos: After completion of all work in an area final interior photos will be taken. The camera must allow the colors to be as close as possible to the actual colors. For number and location of views, see Section 09 06 00, SCHEDULE FOR FINISHES. View shall be taken after final completion of work. The images shall also be provided on a CD to the RE Office.

1.25 HISTORIC PRESERVATION

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

1.26 MEDICAL CENTER STANDARDS

- A. Comply with construction standards of the Medical Center as indicated in GENERAL REQUIREMENTS - SUPPLEMENT.

--- E N D ---

SECTION 01 00 01

GENERAL REQUIREMENTS - VAMC-PR SUPPLEMENT

Part 1 - General

1.1 Provide a Submittal Schedule within fourteen (14) days after receipt of Notice to Proceed and before any items are submitted for review. Compile a complete and comprehensive schedule for all submittals anticipated to be made during progress of the work and submit to the Contracting Officer for approval. The schedule of submittals must be coordinated with the Contractor's construction schedule. Include a list of each type of item for which Contractor's drawings, shop drawings, certificates of compliance, material samples, guarantees, or other types of submittals are required. For each submittal item indicate the specification section and paragraph or other source within the contract documents where the requirements for the submittal item are described. Indicate whether proposed materials, equipment, and other items are as specified or will be submitted as an "or equal" or as a substitution. Upon review and approval by the Contracting Officer, the contractor will be required to adhere to the schedule except where specifically otherwise permitted.

1.2 Work of this project shall be performed between the hours of 7:00 AM and 4:30 PM Monday through Friday, holidays excepted unless other times are arranged in advance and approved in writing by the Project Manager. When the contractor's work interferes with hospital functions, such as when work produces excessive noise, vibrations, odors, dust, utility service interruptions, or other interferences with normal hospital operations that cannot be contained within the area of work, the contractor shall schedule said work at the hours directed by the Project Manager. VA reserves the right to require Contractor to stop or temporarily stop disruptive work where such work interferes with hospital functions.

1.3 Infection Control: All work shall be performed in accordance with the Construction Specifications, refer to Section 010000 GENERAL REQUIREMENTS and Section 015610 DUST AND AIRBORNE CONTAMINANTS CONTROL. For purposes of this project, the work shall be considered a minimum protection Class IV throughout the facility and shall be accomplished using the controls indicated in the specifications and on the Infection Control Construction Permit (attached as part of the contract documents) for this class of protection. No work will be allowed to proceed until an Infection Control Construction Permit has been completed and signed and all protective measures required by the permit are in place.

1.4 The contractor shall arrange with the Project Manager for allocation of required workspace and for the storage of equipment and material to be used for this project. Storage space is very limited. There are no exclusive areas within the campus that can be given to the contractor for their storage needs. Additionally, no space will be made available for the placement of a contractor trailer for this project. The Contractor should schedule delivery of materials to limit the amount of storage space and time.

1.5 The Contractor shall note this scope of work does not detail all existing structures, utilities, or components that may potentially interfere with the contract work required. The contractor shall note any

obstruction, utility, or condition that may hinder or interfere with the execution of this contract and the contractor shall make provisions in their contract price to resolve such interferences and other conditions that may hinder the proper completion of the work. All proposed utility relocations, interruptions, and shutdowns shall be approved by the Project Manager prior to commencing such work. The contractor shall verify all existing utility installations and take appropriate action prior to working around any potential utility installation.

- 1.5.1 Prior to drilling or coring into or through any concrete floor, beam, column, or other structural element the contractor shall conduct non-destructive surveys to identify the presence of any embedded items such as conduits, piping, reinforcing steel, or other items that may be damaged by the proposed drilling or coring. Contractor shall use the results of this survey to determine a location for drilling or coring that will not damage embedded items in the structure.
- 1.5.2 Prior to excavating for any purpose, the contractor shall perform a survey using ground-penetrating radar or other non-destructive survey method to identify the location of existing underground utilities. The contractor shall use the results of this survey to determine means necessary to protect existing underground utilities from damage during construction.
- 1.6 In the event a shutdown, restriction, or interruption of any utility services is required, a written request must be submitted (at least 2 weeks in advance) and approved by the VA Project Manager. All utility shutdowns must be reviewed and approved by the VA.
- 1.7 Comply with Providence VAMC Policy 138-19 regarding Interim life Safety Measures at Appendix C of this specification. Provide Interim Life Safety Measures (ILSM) as necessary to ensure that the continued occupancy of all VAMC Providence buildings can be safely maintained during construction in accordance with NFPA 101, The Life Safety Code.
- 1.8 Contractor shall participate with the VA in the preparation of an Interim Life Safety Plan that will be implemented during construction of this project. At a minimum, the Contractor shall comply with the following requirements of the interim life safety plan:
 - a. Ensure building exits provide free and unobstructed egress for all occupants.
 - b. Contractor shall maintain escape facilities for construction workers at all times. Means of egress in construction areas will be inspected daily. If required by the Contractor's operation, establish and mark alternate means of egress.
 - c. Ensure free and unobstructed access to all areas of the project site for emergency services and for emergency forces.
 - d. Ensure that existing fire alarm, detection, and suppression systems are not impaired by the Contractor's operations.
 - e. 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 in accordance with NFPA standards for impairments more than 4 hours in a 24-hour period. Request interruptions in writing a minimum of 72 hours in advance and coordinate with the Project Manager.

f. Provide written procedures and guidelines for construction personnel and post in the immediate areas of construction including instructions and personnel to contact in the event of fire or emergency.

g. Maintain the construction area to minimize the potential for fire or safety hazards resulting from storage of construction material, construction waste and debris during construction operations.

h. All temporary construction shall be built of noncombustible/fire retardant materials and shall be smoke tight.

i. Ensure that all penetrations made in fire resistance assemblies of the existing hospital building, to include smoke barriers, fire separation assemblies, and fire walls, are properly fire stopped within 4 hours after making the penetration.

ii. If not required to be installed under this contract, notify Resident Engineer of existing improperly installed or missing firestopping discovered during execution of the Work.

j. Any fire watch required by this contract shall be by a qualified person provided by the Contractor who shall maintain constant observation of the affected area and have no other duties. The person providing the fire watch shall be trained in fire prevention and in the use of fire extinguishers, occupant hose lines, occupant fire protection system, in sounding the building fire alarm and in notifying the local fire department, and in understanding the particular fire safety situation for the project.

1.9 Contractor shall comply with the requirements to prevent false fire alarms as provided in Appendix A of this specification. Contractor shall provide a fire watch in accordance with paragraph 1.8 above when impairment of the fire alarm system exceeds 4 hours in a 24 hour period for purposes of preventing false fire alarms.

1.10 Sprinkler systems will not be shut down except for portions of the sprinkler system under renovation, modification or construction, or for new connections to the sprinkler system. Sprinkler systems will not be shut down to avoid accidental discharge of the sprinkler system caused by unintentional damage to the sprinkler system from construction activity. Provide metal head guards at each sprinkler head within the limits of work.

1.11 Do not compromise the integrity of existing smoke and fire barriers within any building. Comply with Providence VAMC Policy 138-11 requirements for maintaining the integrity of the existing fire protective construction. VAMC Policy 138-11 is at Appendix E to this specification section. Obtain permits from Providence VAMC prior to any installation of equipment, cables, power connections, conduit, piping or other work that penetrates or disturbs a smoke or fire barrier. All such work shall be approved by Facilities

Management Service (FMS) of the VAMC Providence. A penetration permit must be secured from FMS prior to disturbing the integrity of any fire or smoke barrier. The permit must be available for inspection at the project location. After the work is completed, the penetration must be repaired (sealed) utilizing UL/FM-listed through penetration fire stopping materials that meet the original smoke and fire compartmentalization performance of the barrier that was penetrated. All penetrations and miscellaneous openings must be protected according to NFPA 101, chapter 8. Upon completion of any penetration repair, a visual inspection for approval must be requested from, and completed by the COTR.

- 1.12 Comply with requirements of the Providence VAMC Contractor Safety Manual, latest edition, which is included at Appendix D to this specification.
- 1.13 The US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, is incorporated by reference and the contractor shall comply with the requirements of this manual. In the event of a conflict between the requirements of EM 385-1-1 and the Providence VAMC Contractor Safety Manual, the more stringent requirements shall apply.
- 1.14 All permits shall be posted in a visible location where the work is being performed (e.g., penetration permit, hot work permit, infection control permit).
- 1.15 Unless noted otherwise, the Contractor shall have present on the project site at any time work is being performed an employee of the Contractor who possesses a PIV (Personal Identity Verification) badge issued by the Providence VAMC. The PIV badge is part of a program mandated by Homeland Security Presidential Directive 12 and the Federal Information Processing Standard Publication 201-1. PIV badges take up to 3 months to obtain due to VA policy that requires that a background investigation (NACI) be completed prior to issuing the PIV badge. Requests for a PIV badge shall be initiated through the VA's Project Manager to the PIV Sponsor in FMS. The Contractor shall complete and submit the PIV Form 0711 and fingerprint forms, and provide two forms of identification (such as driver's license, birth certificate or passport). The Contractor shall pay the cost of any background investigation required to obtain the PIV badge. Providence VAMC will approve no more than two (2) PIV badges for a contractor for a single project. In no case will a PIV badge be issued to any sub-contractor. All other contractor personnel shall obtain a short-term identification badge issued by the Project Manager. Such badge shall be worn by the individual and prominently displayed at all times while on VA property. No employee of the contractor shall enter the project site without a valid identification badge issued by the VA. In order to obtain a short-term identification badge, contractor personnel shall present to the Project Manager a valid (non-expired) photo identification issued by a US federal, state or local government agency. All Contractor personnel are subject to inspection of personal effects when entering or leaving the project site.
- 1.16 Smoking is not permitted anywhere on VA property, except in areas clearly marked and designated for smoking. Currently, there is only one such designated area at the VAMC Providence.

- 1.17 For written Requests for Information, Contractors shall use the form at Appendix B to this specification.
- 1.18 Contractor parking at Providence VAMC is limited to the parking lot in Davis Park (off Chalkstone Avenue).
- 1.19 Cutting and Patching: Cutting of existing surfaces shall be made along neat, straight lines and shall extend only to the limits needed for the new work. Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using new materials of the same quality as that applied to existing adjacent finished surfaces. Perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surface of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface in appearance, texture, level, and finish. If adjacent existing surfaces are painted, the patched surface shall be painted in 3 coats (primer and 2 finish coats) using a paint that is compatible with the materials used for patching and in a color that matches the existing paint finish. Painting of patched walls shall cover the entire patched surface and extend vertically across existing surfaces from floor level to ceiling level and horizontally to a point where the existing wall surface changes direction. If adjacent existing wall surfaces are finished with wall covering, provide new wall covering to match color and texture of existing. Cover entire patched surface and extend new wall covering vertically across existing surfaces from floor level to ceiling level and extend horizontally across existing surfaces to match existing wall covering in a neat vertical line.

APPENDICES

- A - Fire Systems Protection during Construction
- B - Request for Information
- C - VAMC Providence Policy 138-19 Interim Life Safety Measures
- D - Providence VAMC Contractor Safety Manual
- E - VAMC Providence Policy 138-11 Fire Wall/Smoke Barrier Penetration Permits
- F - VAMC Providence Policy 138-4 Hot Work Policy
- G - VAMC Providence Hot Work Permit Form (1 Day)
- H - VAMC Providence Hot Work Permit Form (Up to 5 Days)
- I - VAMC Providence Infection Control Construction Permit, Program, Checklist

-----END-----

Appendix A

Fire Systems Protection During Construction

1. Preventing False Fire Alarms by Smoke Detectors During Construction
Construction and building maintenance activities can potentially generate sufficient airborne dust to activate a fire alarm through nearby smoke detectors. An alarm activated by a smoke detector is immediately transmitted to the municipal fire department, which responds to the hospital with equipment and personnel. In order to prevent false fire alarms from smoke detectors during construction or other maintenance activities, it has been the practice of construction personnel to place a cover over nearby smoke detectors to prevent airborne dust from entering the detector. This practice has been effective in preventing false fire alarms; however this practice has also led to undocumented impairments to the fire alarm system when these covers are not removed when no longer needed to prevent a false alarm.

The following measures will be taken to prevent false fire alarms through smoke detectors during construction while maintaining effective control over impairments to the fire alarm system:

-When it is determined that a smoke detector may be activated by construction dust, the contractor or project manager shall direct a request to one of the hospital's electronics technicians to disable the smoke detector or any other device of the fire alarm system. The request shall include the Node, Loop, and Address of the device(s) to be disabled, the duration, and the specific types of construction or maintenance activities that are planned. The electronics technician will disable the smoke detector until notified by either the contractor or project manager that construction has ended for the day. When notified that construction has ended for the day, the electronics technician will re-enable the smoke detector. The smoke detector that is disabled will indicate a "trouble" condition at the fire alarm control panel and serve as an active indication that a smoke detector or multiple detectors have been impaired. The "trouble" indication will also serve as a continuous reminder to hospital staff that the smoke detector(s) must be restored to normal service.

--Contractors or project managers shall provide at least 48 hours notice to the electronics technicians for disabling of a smoke detector or any other fire alarm system device.

--In no case will the smoke detector(s) be disabled for more than 8 hours in a single 24 hour period. If any smoke detector or any other fire alarm system device is disabled for more than 4 hours in a 24 hour period, the project manager will prepare an ILSM risk assessment and a fire watch will be provided by the construction contractor as specified in the contract documents, or by hospital staff as designated by the project manager.

--Covers shall not be used on a smoke detector at any time. If found, covers shall be immediately removed from smoke detectors.

2. Sprinkler System Shutdowns during Construction

Construction and building maintenance may require the removal, modification, or relocation of sprinkler heads or piping as well as work that may cause unintentional damage to sprinkler heads. In order to prevent an accidental discharge of the facility's sprinkler system a procedure has been implemented for sprinkler system shutdowns.

The following measures will be taken to prevent accidental sprinkler system discharge, or to ensure that flooding does not occur as a result of a sprinkler system modification during construction, while maintaining effective control over impairments to the installed sprinkler system:

When it is determined that the facility's sprinkler system must be shut down to prevent flooding or for system modifications, the contractor or project manager shall direct a request for shutdown to one of the hospital's electronics technicians. The request shall identify the specific area of the hospital impacted by the shutdown and the shutdown duration. The shutdown will be performed by one of the hospital's electronics technicians. The electronics technician will disable the fire alarm system points necessary to prevent false annunciation of a sprinkler system discharge. The electronics technician, or the sprinkler system contractor when authorized in writing by the hospital, will close the appropriate riser valve(s) to isolate that portion of the sprinkler system that is being worked on or that needs to be isolated for protection from flooding should a sprinkler head be damaged. The closed sprinkler valve(s) shall be identified with a sprinkler valve "SHUT" tag by the party that closed the valve(s). The closed sprinkler valve(s) will indicate a "trouble" condition at the fire alarm control panel to serve as an active indication that the sprinkler system has been impaired. The "trouble" indication will also serve as a continuous reminder to hospital staff that the sprinkler system must be restored to service.

If a section of the sprinkler system is to be drained for piping or sprinkler head replacement work, the electronics technician will notify the City of Providence fire alarm division that the master box will be out of service and disable the appropriate sprinkler flow switches and/or fire main. Once the system is drained in the specific area, the electronics technician can reinstall all sprinkler system flow switch devices and the master box so that they are not required to be present in the fire alarm room as a fire watch for the system. At the completion of the sprinkler system work, the contractor or project manager is responsible for notifying the electronics technician that the construction activity has ended for the day and that the sprinkler system is to be refilled and restored to normal operation. The electronics technician must take out all flow switches, fire alarm annunciating devices, and possibly main fire pump prior to recharging of the system. Once the appropriate devices are disabled the electronics technician, or the contractor when authorized in writing by the hospital, can then start filling the system and bleeding air out the Inspector Test Valve (ITV) until the sprinkler system is completely refilled in the specific area of the

facility. The contractor must stay in the impacted area for a minimum of 15 minutes after the system is refilled to ensure there are no leaks in or abnormalities to the fire and sprinkler systems.

--Contractors or project managers shall provide at least 48 hours notice to the electronics technicians for sprinkler system shutdown. Email is the preferred method of notification.

--In no case will the sprinkler system be disabled on two consecutive floors or in multiple areas at the same time in the main hospital building.

--In no case will the sprinkler system be disabled while smoke detectors or other fire alarm initiating devices are disabled in the same area.

--In no case will the sprinkler system be disabled for more than 8 hours in a single 24 hour period. If the sprinkler system must be disabled for more than 4 hours in a 24 hour period, the project manager will prepare an ILSM risk assessment and a fire watch will be provided by the construction contractor as specified in the contract documents, or by hospital staff as designated by the project manager.



Providence VA Medical Center
Facilities Management Service
633 Atwells Ave. 3rd floor
Providence, R.I. 02909
401-459-4760
Fax 401-421-0594

REQUEST FOR INFORMATION NO.

PROJECT TITLE: _____ CONTRACT NO. _____ VA PROJECT NO. _____	DATE REQUIRED: _____
TO: _____	FROM: _____

REQUEST:

--

Requested By: _____ Date: _____

Signed: _____

RESPONSE:

--



This response does not constitute a change to the contract and is not an authorization to the contractor to proceed with any work that modifies the contract price or the time of performance. If the contractor believes that this response modifies any portion of the contract, the contractor shall make timely notice to the Contracting Officer and await the Contracting Officer's direction before proceeding with any work that the contractor believes is a modification to the contract.



This response may constitute a change to the contract documents. Do not proceed with any work indicated in this response that changes the contract documents until directed in writing by the Contracting Officer.

Response By: _____	Concur: _____
Signed: _____	Signed: _____ VA Project Manager
Date: _____	Date: _____

Appendix C

PROVIDENCE VAMC INTERIM LIFE SAFETY MEASURES (ILSM) PLAN

ILSM MAY BE REQUIRED IN AREAS OR SMOKE COMPARTMENTS WHERE NEW CONSTRUCTION OR RENOVATIONS ARE TAKING PLACE.

DEFINITION:

INTERIM LIFE SAFETY MEASURES: A series of operational actions taken to temporarily reduce the hazard posed by existing fire prevention or Life Safety Code deficiencies during, and until the completion of a construction or renovation program within an area or smoke compartment.

OBJECTIVES:

1. Determining when ILSM are necessary.
2. Insure that required ILSM in areas/smoke compartments where construction or renovations are taking place are fully adhered to.
3. Determining when ILSM can be terminated

PROCEDURES

1. All new construction/renovation projects must evaluated by the project coordinator /supervisor using the attached **PVAMC ILSM Requirement Assessment Worksheet**.
2. If, upon completion of the worksheet, it is determined that an ILSM Plan is not needed, the project coordinator will send a copy to the PVAMC Safety Manager for concurrence.
3. If, upon completion of the worksheet, it is determined that an ILSM Plan is needed, the project coordinator will complete the form by documenting the administrative actions necessary to mitigate the Life Safety Code deficiencies introduced, and send a copy to the PVAMC Safety Manager for concurrence.
4. Facilities Management Service staff will utilize the attached Interim Life Safety Measures Checklist for conducting inspections of contractor areas when necessary.
5. The **PVAMC ILSM Requirement Assessment Worksheet**, 11 Administrative Actions that may be applied to the project as ILSM, and ILSM assessment flowchart are provided for reference.

- These criteria will be used to evaluate smoke compartments in which a Life Safety Code deficiency has been identified, or in which construction, renovation or alteration activities are planned. Any "Yes" answers below may require ILSM to address occupant safety.

- Document any methods you plan on using, and what measures were taken under comments.

- Send to the Environmental Safety and Health Office-TR7, after completion.

Submitter : _____

Date Submitted: _____

Log# _____

Project: _____

Expected Duration: _____

Building: _____

Floor: _____

Room: _____

Criteria	YES	NO
The issue/work alters or significantly compromises exit access, exiting, or exit discharge building elements		
The issue/work compromises building compartmentation including fire or smoke walls, floor/ceiling assemblies, corridor walls, use area doors, or other defend in place elements		
The issue/work impairs the building Fire Protection Systems (alarm, sprinklers, suppression) for more than 4 hours in a 24-hour period.		
The activity includes Hot Work		
The activity includes large quantities of combustible materials, flammable materials, or generation of large amounts of dust and debris.		
Access to the area by emergency forces will be impaired		
Will non/limited combustible partitions be required?		

☐ ILSM are required*

☐ ILSM are not required*

* A yes answer to any of the above criteria may require that an ILSM be initiated. Use the following check sheet to denote the interim life safety measures appropriate for the issue/work which compromises life safety. Daily inspections of egress access will be completed in accordance with the checked sheet and completed on the attached form during the pendency of the compromise to a life safety system.. Periodic inspections of other aspects of an ILSM shall be completed during the pendency of the ILSM. All forms will be maintained by the Safety Manager with copies in the project file.

If an ILSM is not required, provide the completed assessment only to the safety manager for review. Maintain a copy in the project file.

Work:

1.

Comments:

1.

Reviewed by: _____ Safety Manager Date: _____

Approved by: _____ Chief Facilities Management Date: _____

Interim Life Safety Measures Check Sheet to be implemented

Project Name or other identifying information: _____

Log Number: _____

Place a check mark in each applicable ILSM activity as determined by an assessment of the risks identified in the Assessment Work Sheet.

#1 INSPECTIONS / SURVEILLANCE

- ☐ Increased surveillance of buildings, grounds, and equipment: shift / daily / other:
- ☐ Means of exiting construction areas inspected daily
- ☐ Implementation of Fire Watch
- ☐ Not applicable

#2 ACCESSIBILITY

- ☐ Maintenance of escape/egress routes from construction areas
- ☐ Maintenance of access to emergency services for emergency equipment, fire alarm pull stations, Fire Department connections (internal & external)
- ☐ Not applicable

#3 EQUIPMENT – LIFE SAFETY

- ☐ Temporary fire alarm, detection, suppression system in place
- ☐ Monthly testing and inspection of temporary systems
- ☐ Provide additional firefighting equipment in project area
- ☐ Provide additional firefighting equipment in adjacent areas
- ☐ Not applicable

#4 COMMUNICATIONS

- ☐ Notification to Municipal Fire Department (or applicable emergency forces group)
- ☐ Not applicable

#5 CONSTRUCTION MATERIALS / PRACTICES

- ☐ Partitions smoke tight and constructed of noncombustible or limited combustible materials
- ☐ Prohibition of smoking throughout building and in and near construction areas
- ☐ Implement appropriate storage practices

#6 FIRE DRILLS

- ☐ Implement appropriate housekeeping practices
- ☐ Implement appropriate debris removal practices
- ☐ Not applicable
- ☐ 2 fire drills per shift per quarter throughout Hospital (one additional drill beyond requirement of EC.5.30).
- ☐ 2 fire drills per shift per quarter in areas adjacent to project (one additional drill beyond requirement of EC.5.30)
- ☐ More than 2 fire drills per shift per quarter throughout Hospital. If yes, how many _____
- ☐ More than 2 fire drills per shift per quarter in areas adjacent to project. If yes, how many _____
- ☐ Not applicable

#7 TRAINING

- ☐ Additional training for staff in immediate area
- ☐ Additional training for staff throughout hospital
- ☐ Additional training for incident response team
- ☐ Training to promote awareness of fire-safety building deficiencies, construction hazards, ILSM
- ☐ Training on changes in physical environment (egress routes)
- ☐ Training on firefighting equipment
- ☐ Training on compensating for impaired structural or compartmentalization features of fire safety
- ☐ Not applicable

Other measures: _____

Comments: _____

Prepared by: _____

Reviewed by: _____ Safety Manager Date: _____

Approved by: _____ Chief Facilities Management Date: _____

ILSM Inspection Form

Project Name: _____

Log Number: _____

Date: _____

Daily _____ Weekly _____ Monthly _____

	Measure	<u>Applicable</u>		Compliance Status	Date/Initials
		Y	N		
1.	Exits are inspected on a daily basis and are free and unobstructed. No construction materials, equipment, or debris block free use of all exits adjacent to the construction site or are impacted by the project. Temporary exit signs are in place.				
2.	Provide temporary, but equivalent fire alarm and detection system.				
3.	Provides additional fire-fighting equipment (fire extinguishers). Equipment is functional and tests are up to date.				
4.	Temporary construction partitions are smoke tight, or made of noncombustible material, or made of limited combustible material that will not contribute to the development or spread of fire.				
5.	Surveillance is increased of buildings, grounds, and equipment with special attention to construction areas and storage, excavation, and field offices.				
6.	Enforces storage, housekeeping, and debris removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level.				
7.	Additional training is provided to those in the hospital on the use of fire-fighting equipment.				
8.	One additional fire drill per shift, per quarter is conducted.				
9.	Temporary systems are tested and inspected monthly, and the completion dates for these tests is documented.				
10.	Education is conducted to promote the awareness of building deficiencies, construction hazards, and temporary measures implemented to maintain fire safety.				
11.	Training for those who work in the hospital is done to compensate for impaired structural or compartmental features.				

Prepared by: _____ Project Manager, Date: _____

Inspected by: _____ Date: _____

Providence VA Medical Center Construction Safety Manual

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INTRODUCTION

All contractors, Project Managers, and employees engaged in construction activities at the PVAMC must be aware of the construction safety requirements outlined in this manual.

The implementation of construction safety programs will minimize the potential for injuries and illnesses to our patients, employees and visitors from unsafe construction activities conducted by contractors and VA employees, including operations and maintenance crews, permanent construction crews and temporary purchase and hire staff.

It is the policy of the VHA to protect patients, staff, visitors and contractors from safety and health hazards associated with construction activity on VA/VHA property and leased property at which VA-funded construction is occurring.

Construction activities are defined as those that include VHA projects performed by employees or contractors and enhanced use lease projects within structures fully managed by VHA or within the purview of VHA authority.

Safety is a philosophy and a practice that identifies and eliminates job site hazards throughout the lifecycle of a project and discourages work practices and equipment that place individuals at risk of injury.

This manual outlines programs and procedures to maintain a healthy environment of care for our patients and a safe and healthy worksite for employees, visitors and contractors during construction activities.

1.0 GENERAL INFORMATION

1.1 Standard Safety and Security Rules

The following are some reasons for which an employee of a contractor may be temporarily or permanently removed from Medical Center premises:

- Possession or use of alcoholic beverages or regulated drugs not prescribed by a physician
 - Possession of explosives, firearms, ammunition, and other weapons
 - Deliberate violation of safety or security rules
 - Illegal dumping, handling, or disposal of hazardous materials
 - Destruction or removal, without written permission, of any property belonging to Providence VAMC, the property owner, employee, or other contractors or employees
 - Failure to follow the directions or instructions of a VA Police Officer, VA COTR or VA Project Manager
 - Failure to wear in a visible manner a facility issued identification badge
 - Intimidating, threatening, harassing, impeding or interfering with an inspector, security officer, or Providence VAMC employee or designated representative
 - Using emergency exits other than for emergencies
 - Misuse of fire prevention and protection equipment
 - Unauthorized removal or destruction of a safety barricade, handrail, guardrail, warning sign, fall protection, or other warning devices intended to protect PVAMC's students, faculty, employees, neighbors or property.
- For additional information on safety guidelines that are related to security issues, you may refer to the Providence VAMC Police Department

1.2 Safety Permits and Procedures

The following operations may present a hazard to PVAMC employees, visitors, patients, neighbors or property. Therefore, you must obtain written approval through the Providence VAMC Project Manager before:

- Working on fire protection/detection systems
- Penetrating any smoke/fire barrier wall
- Performing burning, welding, cutting, soldering, or other hot work
- Performing any work above an existing finished ceiling
- Obstructing an exit door or any exit path within any building
- Obstructing access to the hospital by emergency services
- Working on electrical, steam, chilled water systems or other energized systems
- Moving emergency equipment (fire extinguishers, first aid kits, etc.) provided by PVAMC
- Installing a temporary electrical service
- Working with hazardous chemicals (including solvents and paints)
- Generating hazardous wastes (including waste oil)
- Using powder actuated tools
- Using a gas, diesel, or LP (propane) powered engine indoors
- Operating a power vehicle or self-propelled work platform
- Excavation/trenching
- Using radioactive sources or conducting field radiography (x-ray)
- Working with asbestos-containing materials
- Working on security systems
- Working with compressed air/gases
- Using a laser
- Working on a fume or biological hood
- Working on a solvent storage cabinet
- Working on heating, ventilation, or air conditioning equipment
- Working on a roof
- Lifting or hoisting with cranes, derricks, hoists or helicopter
- Performing blasting operations

Special Rules for Operations Involving Utilities:

- Only Providence VAMC Facilities Operations may shut down or start up operating utilities.
- You must notify your Project Manager, who will coordinate with Providence VAMC Facilities Operations, *in advance* of the need for such shutdowns or startups.

Special Rules for Lockout/Tagout of Machinery, Pipes, etc.:

- If you intend to service or maintain machinery that could hurt someone if it were to unexpectedly start up, you must inform the Providence VAMC Project Manager of the Lockout/Tagout procedures you intend to follow.
- See Section 3.3 on Lockout/Tagout generally.

1.3 Housekeeping

You must maintain good housekeeping. You must keep work areas neat, clean, orderly and free of excess trash and debris and never block walkways, stairs, exits, or create a tripping hazard. Cover and/or place guardrails around open holes, trenches, or excavations into which PVAMC's visitors, patients, or employees may fall. Poor housekeeping at a job site may lead to an increased potential for safety hazards and an increased incidence of accidents and chemical spills.

1.4 Accident, Incident, Injury, or Illness

After notifying the appropriate emergency agency (e.g., 9-1-1), work related accidents, incidents, injuries, and illnesses must be immediately reported to the Providence VAMC Project Manager or representative. The Contractor is responsible for notifying OSHA for any incidents that are reportable to that agency.

2.0 ENVIRONMENTAL ISSUES

2.1 Hazardous Waste Management

Hazardous waste generated by a Contractor as part of its work must be properly identified, stored and disposed of in accordance with all applicable local, state and federal laws. The Contractor must coordinate with its Providence VAMC representative to provide a list of hazardous waste(s) to be generated during the project, and to determine the location(s) available for hazardous waste storage. The Contractor must also ensure, at a minimum, proper labeling, adequate secondary containment, segregation of incompatible materials and routine inspection of storage areas as required by law. In addition, all hazardous waste containers shall be constructed of a material that is compatible with the waste, shall be in sound condition, and shall be kept securely closed at all times in accordance with applicable regulations.

Containers and/or tanks used to store hazardous wastes must be managed in accordance with applicable regulations and must be inspected daily.

The Contractor is responsible for completing all disposal documents, which may include, but are not limited to, waste profiles, waste analytical samples and hazardous waste manifests. Providence VAMC shall be designated as the Generator on all documents and shall be provided with copies of all waste analyses, land disposal restriction forms and related documentation. Copies of all disposal documents shall be submitted to the Project Manager for review at least 5 days prior to shipment. The Project Manager or an EH&S representative will sign the manifests as the Generator. At the time of shipment, the Contractor shall provide the bottom three copies of the manifest to the Project Manager or the PVAMC EH&S representative for distribution to the appropriate agencies.

Contractor employees must be appropriately trained in hazardous waste procedures. In the event a Contractor encounters previously unidentified material that is reasonably believed to be radioactive, volatile, corrosive, flammable, explosive, biomedical, infectious, toxic, hazardous, asbestos containing or oil-based, the Contractor shall immediately stop work in the affected area and report the condition to the Project Manager. At no time shall such material be disposed of in chutes, dumpsters, drains, pipes or any other waste container. The Contractor agrees to cooperate with the Project Manager and any consultants engaged by the Project Manager to perform services with respect to the analysis, detection, removal, containment, treatment and disposal of such regulated materials.

2.2 Transport of Hazardous Materials

All transportation of hazardous materials while on Providence VAMC property shall be conducted in accordance with USDOT Hazardous Materials Regulations for proper packaging, marking/labeling, handling, documentation, etc. At no time should hazardous materials be transported via public or private roads at Providence VAMC in a manner that could result in an unsafe condition for personnel or the environment.

2.3 Spill Prevention and Control

Providence VAMC's Spill Prevention Control and Countermeasures (SPCC) Program establishes Medical Center-wide procedures for the prevention and detection of spills and/or releases of oil or hazardous materials, including the following:

- Based on the inventory of oil and hazardous chemicals that will be brought on-site, the Contractor shall have available equipment (e.g., secondary containment pallets, absorbent pads, absorbent booms, speedi-dry) that is suitable and sufficient to control a potential spill/release.
- The Contractor is responsible for identifying conveyances to the environment (e.g., sumps, storm/floor drains, etc.) and adequately minimizing spill potential to these areas.
- The Contractor is responsible for the proper storage of all flammable and combustible chemicals that are brought and/or stored on site to complete the work of this contract. Such storage may require the use of safety containers, safety cabinets, and/or secondary containment. The Contractor shall also ensure that any incompatible chemicals are safely segregated. The Contractor is responsible for maintaining and securing all chemical containers and all chemical storage areas. This requires selecting locations and methods to minimize exposure to rainfall, surface water, and the ground surface or subsurface. Enclosures, shelters, and secondary containment should be used where appropriate.
- The Contractor must use appropriate protective procedures such as double containment, employee training, overflow protection, and other measures as part of activities involving the use, storage, or handling of petroleum products or hazardous materials on Providence VAMC Property.
- The Contractor must ensure that his/her employees are adequately trained in spill procedures outlined below. The Medical Center's SPCC Program also establishes reporting requirements in the event of a spill or release of oil or hazardous materials. In the event of a release or spill, the Contractor must follow all of the reporting requirements of the SPCC Program as specified below:

(1) The Contractor shall extinguish all sources of ignition and isolate incompatibles or reactive chemical substances.

(2) The Contractor shall determine if the spill/release is incidental or non-incidental.

(3) For incidental spills/releases:

- ◆ The Contractor shall attempt to stop or contain the spill/release at the source provided that doing so does not endanger anyone.
- ◆ The Contractor shall prevent discharge of materials to environmental receptors including drains, sumps, soil, etc.
- ◆ The Contractor shall immediately notify the Project Manager of all incidental spills/releases.
- ◆ The Contractor is responsible for the proper collection, storage and disposal of waste materials in compliance with EPA and R.I. DEM regulations and in cooperation with the Project Manager.

(4) For non-incidental spills/release:

- ◆ The Contractor shall immediately report the spill/release to the Medical Center's Environmental Health & Safety (EH&S) Department who will advise you on the need for initiating contact with spill response vendors.
- ◆ The Contractor shall follow the steps for incidental spill/releases identified in item (3) above, provided that it is safe to do so.
- ◆ PVAMC's EH&S Department will coordinate ALL reporting to outside agencies and will conduct follow-up written notifications if necessary.
- ◆ The Contractor will conduct an incident analysis and coordinate with the Project Manager and the PVAMC EH&S Department on any actions that are required to prevent recurrence.
- ◆ If it is deemed necessary to engage a professional spill cleanup company, the PVAMC EH&S Department will coordinate the cleanup through the Project Manager.

2.4 Pest Control

If a Contractor or his/her employees see evidence of cockroaches, mice, ants or other pests during the course of their work, they must notify the Project Manager immediately. The Contractor shall not use any insecticide products on Medical Center property unless such activities are part of your contracted work and you are specifically trained to do so.

2.5 Air Emissions

Combustion Units

[Combustion units include, but are not limited to, boilers, heaters, emergency generators and kilns.]

1. **"Incidental"** spills meet **ALL** of the following criteria: 1) personnel are familiar with the hazards associated with the spilled material; 2) containment/response does not pose potential health and safety hazards (e.g. fire, explosion or chemical exposure); 3) a small quantity (less than 10 gallons) of material is spilled/release which **DOES NOT** reach the environment or pose potential health and hazardous; and 4) spilled/release material can be readily absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate area or by maintenance personnel.

"Non-incidenta" spills include 1) major spills/release (e.g. greater than 10 gallons) that do not reach the environment or 2) any amount of spilled material that escapes to the environment (including drains, sumps, soil, etc.).

All Contractors must immediately report the following to the Project Manager:

- Any maintenance or repairs to a combustion unit that could result in a change in maximum heat input value or overall emissions (e.g. burner replacement or fuel conversions)
- Any conditions discovered which could have resulted in an increase on air pollutant emissions.

CFC Containing Units [CFC containing units include those containing any ozone depleting refrigerants including, but not limited to, Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC).]

Contractors shall immediately notify the Project Manager whenever they become aware of any unintentional or intentional release of CFCs above de-minimis levels as established by EPA regulators.

Contractors shall provide the following documentation to the Project Manager:

- EPA certifications for any reclaimers to which CFC products evacuated from Providence VAMC systems are to be sent.
- Certifications for any CFC recycle/recovery equipment to be used at PVAMC
- Technician Certifications
- Service records for all units containing greater than 50 pounds of refrigerant. Records must include the date and type of service and the type and quantity of refrigerant added.

Contractors shall immediately notify and provide documentation to the Project Manager whenever:

- A leak rate equals or exceeds 35% per year for commercial/industrial processes
- A leak rate equals or exceeds 15% per year for comfort cooling processes
- A release occurs of >100 pounds in a 24 hour period for CFC-12, CFC-113 and R-500. Halon Service providers shall immediately notify the Project Manager whenever it becomes aware of any unintentional or intentional release of halon.

2.6 Stormwater and Wastewater

Stormwater

Projects that disrupt over one (1) acre of land must adhere to the EPA's Phase II stormwater requirements.

These projects are required to obtain a NPDES permit and implement best management practices. The Contractor is responsible for obtaining such permits before the start of work.

Wastewater

Providence VAMC's wastewater discharge is regulated by Narragansett Bay Commission (NBC). The discharge of any wastewater must adhere to these permit requirements. These include but are not limited to:

- No discharge of mercury, silver or other metal-bearing wastewater
- No discharge of highly corrosive substances ($5 < \text{pH} < 10.5$)
- No discharge of flammable materials that could create a hazard for Providence VAMC personnel these are the only references that will be noted in the policy. or NBC treatment works personnel.

1.0 The Contractor must identify all wastewater streams for the Project Manager and obtain approval for drain discharge.

2.7 Biological/Chemical/Radioactivity Hazards

Some Providence VAMC operations involve the use of biological, chemical, or radioactive material that can be hazardous to PVAMC's visitors, patients, or employees if not handled safely. Areas where work with biological, chemical, or radioactive materials is being performed will be marked with appropriate signs. Do not enter these areas and do not handle hazardous biological, chemical, or radioactive material unless it is part of your contracted work and you are specifically trained to do so.

2.8 Asbestos Containing Materials

Providence VAMC will have determined, before work is begun, the presence, location, and quantity of asbestos-containing or potentially asbestos-containing materials that would be specifically impacted by the work of your contract. The Providence VAMC Project Manager will provide a specific asbestos audit report for those work areas in question. The contractor shall not disturb asbestos-containing materials unless such activities are part of your contracted work and you are specifically trained to do so. Asbestos abatement contractors should coordinate with the Project Manager and the Medical Center's EH&S Department for specific requirements for asbestos abatement work.

The Contractor shall not disturb, damage or otherwise handle any *suspect* asbestos containing material. It is recommended that the following suspect materials be assumed to contain asbestos:

Cement Pipes, High Temperature Gaskets, Electrical Wiring Insulation
Cement Wallboard, Lab Hoods/Benches/Gloves, Chalkboards
Cement Wallboard, Fire Blankets/Curtains/Doors, Roofing Shingles and Felt
Flooring, Backing, Elevator Equipment Panels, Base Flashing
Construction Mastics, Elevator Brake Shoes, Thermal Paper Products
Acoustical Plaster, HVAC Duct Insulation, Caulking/Putties
Decorative Plaster, Boiler Insulation Adhesives
Textured Paints/Coatings, Breeching, Insulation, Wallboard
Ceiling Tiles and Lay-in Panels, Pipe Insulation, Joint Compound
Spray-applied Insulation, Cooling Towers, Vinyl Wall Coverings
Blown-in Insulation, Electrical Cloth, Asphalt Floor Tile

Fireproofing Materials, Heating and Electrical Ducts, Vinyl Sheet Flooring

Taping Compounds, Electrical Panel Partitions, Vinyl Floor Tile

Packing Materials (wall/floor penetrations), Ductwork, Flexible Fabric, Connectors, Spackling Compounds

The Contractor shall not sweep, dust, vacuum or mop dust or debris that is the product of a suspect asbestos containing material. The Contractor shall also not pick up or throw away any suspect asbestos-containing waste or trash. If it material that is suspected to be asbestos-containing is disturbed and becomes airborne, the Contractor shall immediately notify the Project Manager.

If it is part of the Contractor's work, stripping of floor finishes shall be done using low abrasion pads at speeds lower than 300 rpm and wet methods shall be used. The Contractor shall take care not to overstrip floors and shall stop stripping immediately upon removal of the old surface coat. Sanding of flooring material is strictly prohibited unless it is part of your contracted work and you are specifically trained to do so.

Any suspect asbestos containing material that is observed by the Contractor to be crushed, ripped, broken or in any way damaged should be reported to the Project Manager immediately.

Contractors must, within 24 hours, convey to the Providence VAMC Project Manager any information they newly discover concerning the presence, location and quantity of asbestos-containing or potentially asbestos-containing materials.

2.9 Lead Paint

Unless the Providence VAMC Project Manager provides a specific lead-paint inspection, Contractor's should assume that any painted surface they come in contact with is coated with lead-based paint.

Therefore, Contractor's should not perform any intrusive, dust-generating work on painted surfaces (e.g., drilling, cutting, brazing, scraping, demolition), unless the surface has confirmed to be non-lead or unless such work is part of your contracted work and you are specifically trained to do so.

Any painted surfaces that have loose, flaking, chipping or otherwise non-intact paint should not be impacted by the Contractor and should be reported to the Project Manager immediately.

Lead paint abatement contractors should coordinate with the Project Manager and the Medical Center's EH&S Department for specific requirements for lead abatement work. Refer to the section of this manual on Hazardous Waste for guidelines on the proper disposal of lead containing paint.

3.0 OSHA SAFETY ISSUES

3.1 Hazardous Materials and Hazard Communication

Hazardous Materials

- Do not handle or use hazardous materials without training by your company's representative.
- No solvents, paints, or similar flammable, toxic, or irritating materials may be used in areas occupied by Providence VAMC employees, visitors, or patients unless specifically approved in writing by the Providence VAMC Project Manager.
- Maintain adequate ventilation when paints or solvents are used.
- Use flammable solvents and materials with extreme caution.
- Store flammable paints and solvents in approved flammable liquid storage cabinets if inside buildings.

Hazard Communication

The Contractor shall submit an inventory of all hazardous chemicals that are brought on-site with accompanying Material Safety Data Sheets to the Project Manager. The Contractor shall also ensure that all containers that are brought on site for the storage of hazardous chemicals (e.g., gas, paint, etc.) are labeled and inspected in accordance with all applicable regulations. The Contractor shall remove all hazardous chemicals that it brings on-site when work involving a specific hazardous chemical is complete.

The Contractor may request and review Material Safety Data Sheets for any chemicals that are encountered on Medical Center property during the performance of its work.

3.2 Confined Space Entry

Background

Providence VAMC has developed and implemented a Confined Space Entry Program to protect all Medical Center employees who are required to enter confined spaces. PVAMC's complete written program is available for review upon request to the Project Manager.

This Medical Center-wide program defines a "Confined Space" and an "Enclosed Space" in accordance with 29CFR §§ 1910.146 and 1910.269, respectively. Entrance into any of these spaces by a Contractor requires adherence with all applicable regulations as well as with certain Medical Center protocols as defined further below.

As part of the Confined Space Entry Program, the Medical Center performed hazard assessments, developed inventories and posted all confined and enclosed spaces at the point of entry. These postings include information on the classification of the space (e.g., "Permit Required", "Non-permit Required"), the confined space ID number, the location, the known hazards, and the minimum personal protective equipment needed for entry. Where available the Medical Center's experience with the confined space is also included on the signage. The Medical Center Confined Space Inventory and hazard assessment forms are available for review.

Requirements

- The Contractor is responsible for developing, implementing and maintaining his/her own Confined Space Entry Program, including provisions for emergency rescue in accordance with OSHA regulations as it applies to the work of this contract.
- If during the course of its work, the Contractor encounters a confined space that has not been previously identified by the Medical Center, it must immediately bring the space to the attention of the Project Manager and delay entry until Providence VAMC has examined the space.
- When both Medical Center personnel and Contractor personnel are working in or near confined spaces, the Contractor shall coordinate all operation with the affected Medical Center personnel before entry.
- Advance notification is always required. Whether you enter a confined space with a PVAMC employee or not, the Contractor's entry attendant must always first *inform* the Providence VAMC Project Coordinator *before* you enter a confined space.

The Contractor shall provide the Project Coordinator with:

- The exact location of the confined space and confined space ID number;
- The time of entry and approximate entry duration; and
- The names of authorized attendants and entrants.
- *After the entry:* If you have entered a "permit-required" confined space, you must, after the entry is concluded, notify Providence VAMC Project Coordinator of (1) the permit space program you followed and (2) any hazards you confronted or created in the space.

3.3 Lockout / Tagout

Providence VAMC protects its patients, visitors, employees, neighbors and property in part by complying with 29 CFR 1910.147 – Control of Hazardous Energy Sources (Lockout/Tagout). As part of PVAMC's Lockout/Tagout Program, standard locks and tags are used to control the start-up of equipment that is being serviced or maintained by its employees. At no time shall the Contractor or its employees override any locks or tags that they encounter during the performance of its work.

The Contractor is responsible for developing; implementing and maintaining his/her own Lockout/Tagout Program in accordance with OSHA regulations as it applies to the work of this contract. The Contractor shall submit a copy of its Lockout/Tagout Program to the Project Manager or Property Manager before the start of any work where 29 CFR 1910.147 is applicable. The only purpose of this submission is to ensure that, for the safety of PVAMC's students, faculty, employees, neighbors or property, the Contractor's Lockout/Tagout procedures are consistent with restrictions and prohibitions of PVAMC's Lockout/Tagout program.

- Providence VAMC Engineering and Utilities will shut down and start up utility systems.
 - The Contractor will maintain a log of all machines and equipment that are locked out and/or tagged out during the performance of the work of this contract. This log shall identify the equipment that was worked on, the date that work was performed, and the name of the individual performing the work.
- The Contractor will submit this log to the Project Manager on a monthly basis when Lockout/Tagout work is being performed.

3.4 General Electrical Safety

- Only qualified electricians are permitted to work on electrical systems and equipment that uses or controls electrical power.
- Do not operate electrical tools or equipment in wet areas or areas where potentially flammable dusts, vapors, or liquids are present, unless specifically approved for the location.
- Should a circuit breaker or other protective device "trip," ensure that a qualified electrician checks the circuit and equipment and corrects problems before resetting the breaker.
- Erect barriers and post warning signs to ensure non-authorized personnel stay clear of the work area.
- Report hazards (lack of protective guards or covers, damaged equipment, etc.) to the PVAMC Medical Center Project Manager immediately.
- Do not leave electrical boxes, switch gear, cabinets, or electrical rooms open when not directly attended. Insulate energized parts when covers have been removed or doors are ajar. Use of cardboard, plywood, or other flammable materials to cover energized circuits is prohibited.

3.5 Compressed Gas Cylinders

Compressed gases can pose a severe hazard to PVAMC's patients, visitors, employees, neighbors and property. Therefore, the following measures must be taken for their protection:

- Valve protection caps must be in place when compressed gas cylinders are transported, moved, or stored.
- Close cylinder valves and replace valve covers when work is complete and when cylinders are empty or moved.
- Secure compressed gas cylinders in an upright position in a welding cart or to a solid object (using chains, straps, or a rigid retaining bar). Secure compressed gas cylinders on an approved carrier while being transported.
- Keep cylinders at a safe distance or shielded from welding or cutting operations. Do not place cylinders where they can contact an electrical circuit.
- Keep oxygen and flammable gas regulators in proper working order and a wrench in position on the acetylene valve when in use. If not manifolded together, separate oxygen and flammable gas cylinders by 20 feet or a 5 foot high fireproof barrier.
- If a leak develops in a cylinder and it cannot be immediately corrected, move the cylinder to a safe location outside the building.
- Use only approved spark igniters to light torches.
- Cylinders must not be taken into or stored in confined spaces, including gang boxes and office/storage trailers.
- Do not store hoses and regulators in unventilated or closed containers or areas.
- Do not leave behind partially filled or empty cylinders. Always remove them from the site.

3.6 Powder-Actuated Tools

Powder-actuated tools can pose hazards to PVAMC's patients, visitors, employees, neighbors and property. Such tools are, therefore, not permitted in occupied Providence VAMC buildings without the approval of the PVAMC Medical Center Project Manager. In addition:

- Contractor's who operate powder-actuated tools must be properly trained in their use and carry a valid operator's card provided by the equipment manufacturer.
- Each powder-actuated tool must be stored in its own locked container when not being used.
- A sign at least 7 inches by 10 inches with bold face type reading "POWDER-ACTUATED TOOL IN USE" must be conspicuously posted when the tool is being used.
- Powder-actuated tools must be left unloaded until they are actually ready to be used.
- Powder-actuated tools must be inspected for obstructions or defects each day before use.
- All Powder-actuated tool operators must have and use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors.

3.7 Welding, Cutting, and Brazing Hot Work Permit

- Obtain a permit from the Project Manager for each separate work activity and ensure that all conditions of the permit are met at all times. The permit must be obtained from the Contract Coordinator prior to the start of any welding/cutting/brazing work. In addition, the Contractor must also maintain its own hot work permit system in accordance with OSHA regulations.
- Remove combustible materials from the area before beginning work.
- Elevate oxygen/acetylene hoses seven feet above the work area or otherwise protect them from damage.
- Install anti-flash back (safety/check) valves in both the oxygen/acetylene hoses at the regulator.
- Shield adjacent areas with welding partitions.
- Have a second person stand by with an approved fire extinguisher for welding and burning operations in accordance with OSHA regulations and permit requirements. This person should remain in the area for a minimum of 30 minutes after the hot work is completed to ensure the site is cold.

3.8 Cranes and Rigging

Each crane, rigging, or hoist brought onto Providence VAMC property must have an annual inspection performed by a certified testing agency. Before operations begin on site, documentation, including a log book, must be provided to Providence VAMC Project Manager or its designee.

The operator is responsible for the proper placement of the crane in relationship to the load to be handled and the landing area so as to obtain the best rated lift capacity, and the installation and maintenance of crane swing radius protection.

All operators must possess a valid R.I. hoisting license. Documentation of this license shall be provided to the Providence VAMC Project Manager. At no time shall loads be hoisted by a non licensed operator.

3.9 Miscellaneous Additional Safety Rules for the Protection of PVAMC Patients, Visitors, Employees, Neighbors and Property

- Do not perform work over the heads of people or leave tools or equipment overhead.
- Isolate your work area with safety markers, tape barriers, blinker lights, etc.
- Report unsafe acts or conditions to your supervisor.

FIRE WALL/SMOKE BARRIER PENETRATION PERMIT

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PART 1 GENERAL

1.1 PURPOSE

- A. To establish policy and procedures regarding penetrations in ceilings, floors, pipe chases, rated fire walls, and smoke barriers for the purpose of maintaining the integrity of Building #1 Type II-222 Construction as required in NFPA 101, Chapter 8 and the Joint Commission to provide for the safety of occupants during fire incidents. (The equivalent Construction Type per ICC Building Code is Type IB.)

1.2 POLICY

- A. All penetrations made in floors, fire barriers and smoke partition for the purpose of installation/removal of pipe, conduit, cable, or ductwork or other modifications including incidental damage, or the removal of such item, will be repaired and firestopped upon the completion of the work, and documented as repaired. This policy applies to all vertical and horizontal penetrations and to all medical center staff and Contractors.

1.3 DEFINITIONS

- A. Penetrations are any holes, openings or faults created in a fire barrier or smoke partition that compromise the integrity of the smoke or fire rating of the penetrated structure.
- B. Firestopping materials are any materials used to replace or repair any penetrations. Materials used must meet specifications and testing by FM, UL, or WH that ensure that the original integrity and rating of the penetrated surface will be restored.
- C. Fire Barriers are floor/ceiling assemblies and walls, including supporting construction that meets the conditions of acceptance of NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials. Fire barriers are designed to form fire compartments and are constructed to be continuous from outside wall to outside wall, floor to floor or ceiling, from one fire barrier to another, or a combination thereof, including continuity through concealed spaces.
- D. Smoke Barrier is a continuous membrane designed and constructed to restrict the passage of smoke . Smoke Barriers are designed to form smoke compartments and are constructed to be continuous from outside wall to outside wall, floor to floor or ceiling, from one fire or smoke barrier to another, or a combination thereof, including continuity through concealed spaces.

1.4 SUBMITTALS

- A. Submit manufacturers literature, data, installation instructions and detail drawings for each type of penetrating item and the construction of the barrier it is passing through indicating the type of firestopping and/or smoke stopping material used. Manufacturer's details shall indicate the listing number given by FM, UL, or WH for each firestopping system.
- B. Alternate submittals can be a Certified Laboratory test report for ASTM E814 tests of systems not listed by FM, UL, or WH. (ASTM E814 is the Standard Test Method for Fire Tests of Through-Penetration Firestops.) Another type of submittal is a written Manufacturer's Engineering Judgement, derived from a similar UL system, that a modified design meets the required protection level of the UL listed test.

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 listed firestop system that will maintain the required integrity of the fire or smoke barrier and stop the passage of gases or smoke.

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- B. Through penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 use 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 4 inch nominal pipe of 16 square inches in overall cross sectional area.
- C. Products requiring heat activation to seal an opening by its intumescence shall exhibit a tested and demonstrated ability to function as designed to maintain the fire or smoke barrier.
- D. Firestop sealants used for firestopping or smoke sealing shall have the following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Have no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall, ceiling 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 the following properties:
 - 1. Classified for use with the particular type of penetrating material used.
 - 2. Penetrations containing loose electrical and/or computer data cables, and other non-metallic communications cables shall be protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
 - 3. Intumescent products which would expand to seal the opening shall act as a fire, smoke, toxic fume 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 shall be asbestos free.

PART 3 EXECUTION

- 3.1 Submit for approval all product data drawings and installation instructions, as required by “Submittals”, after examining the Contract Documents and performing an on-site careful examination of the areas to receive firestopping. If there is any doubt about the location of fire rated or smoke rated partitions, request or refer to information contained in the current SOC (Statement of Condition) document and drawings available at the FMS offices.
- 3.2 In all cases when a ceiling, floor, wall or partition designated as a fire or smoke barrier is compromised for the purpose of installation, repair, or other modification, the following steps are required:
 - A. All penetration contracted work, **including Information Resource Management (IRM) projects**, is to be submitted and approved by a Facilities Management Service (FMS) Project Manager or Maintenance Department PM.
 - B. A penetration permit must be secured from a FMS Project Manager or FMS Maintenance Department PM prior to disturbing the integrity of any wall or floor/ceiling barrier. The permit must be available for inspection at the subject location. **(See Attachment “A”, enclosed.)**
 - C. Provide temporary firestopping, smoke seal and waterproofing of all penetrations in smoke and fire rated floor and wall assemblies immediately following core drilling or cutting if permanent work and firestopping measures will follow at a later time.
 - D. Where penetrations are created in existing floors and/or partitions, they shall be temporarily firestopped by the close of construction each day. In the case of major projects requiring the prolonged existence of floor and/or partition openings, temporary firestopping shall be provided at the end of each workday. Temporary firestopping may constitute a single layer of fire rated gypsum

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- board secured in place over the opening or mineral fiber may be placed in the opening. Fiber thickness shall be sufficient to meet or exceed the inherent fire resistance rating of the building material being penetrated and shall be secured in place with non-combustible material or fasteners.
- E. After the final work is completed, the penetration must be firestopped according to the submitted and approved UL, FM or WH listed through penetration firestopping materials or system that meet the original smoke barrier or fire rated construction requirements.
 - F. Upon completion of any penetration repair, a visual inspection for approval shall be requested from and completed by a FMS Project Manager or FMS Maintenance Dept PM.
 - G After completion of the field inspection, the completed permit will be signed by the Contractor/Installer and the inspecting FMS – PM or FMS Maintenance Dept PM. That signed document shall then become the official Document or Record and be distributed as indicated on the Permit Form.

PART 4 RESPONSIBILITY

- 4.1 It is the responsibility of the FMS Project Manager or FMS Maintenance Dept to ensure that penetration permits are issued and final inspections are conducted. Any deficiencies found remaining during the inspection will be discussed with the COTR and remedied by the firestop installer.
- 4.2 The Chief of Facilities Management Service is responsible for ensuring that any PVAMC staff making penetrations into fire and/or smoke barriers shall secure penetration permits prior to beginning work, properly firestop the wall/ceiling/floor penetration, and sign off the permit after inspection and completion of the work.
- 4.3 Contractors are responsible for assuring that they properly firestop any penetrations that they make in ceiling, floor, pipe chases, fire rated walls, and smoke barriers in accordance with submitted and approved firestop materials and/or systems.
- 4.4 Contract Officer Technical Representatives (COTR's) are responsible for ensuring that all Contractors and FMS personnel adhere to this policy during construction, renovation or demolition activities, including pulling electrical and/or data cables. The COTR is responsible for verifying that all holes and penetrations made during the construction activities are properly sealed. The COTR is also responsible for ensuring that this memorandum is properly inserted in all applicable Contracts and Work Orders issued by FMS.

End of Policy Memorandum

REFER TO AND FILL OUT THE ATTACHED “FIRE/SMOKE BARRIER PENETRATION PERMIT”.

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POLICY MEMORANDUM 138 – 11

MARCH, 25 2011

Attachment A

FIRE/SMOKE WALL PENETRATION PERMIT

Contractor or FMS Dept or VA Service Requesting Permit: _____

Responsible Person For Request (Firm/Dept & Person): _____

Location of Penetrations (Bldg/Floor): _____

Work Narrative (Project No. or Purpose): _____

Before issuing a Floor/Fire Wall/Smoke Barrier Penetration Permit, the FMS Project Manager or Maintenance Dept shall review the following checklist with the Permit Requesting Responsible person for compliance. (Contractor to be reminded that all penetrations shall be temporarily firestopped at close of each work day.)

Question	Yes	No	N/A
Did the Responsible person (indicated above) obtain prints (SOC Plans) from FMS Maintenance Section or PM Section detailing hourly rated walls and smoke barriers in the building; and have they thoroughly identified the scope of the firestop work?			
Is the manufacturer's UL, FM, or WH product and application guide for each type of wall or floor penetrated by each type of utility element been submitted, approved and available for on- site review by installers and inspectors?			
Has the Responsible person (indicated above) prepared an itemized schedule of floor and fire/smoke walls to be penetrated indicating the UL, FM or WH system to be used?			

Materials utilized in repair:

Fire-stopping UL, FM or WH System Number(s) **Attach submittals:** _____

Wall Board Type & number of layers (if used) _____

Other: (Manufacturer's Engineering Judgement:) **Attach submittal:** _____

Approving FMS PM or Maintenance Signature: _____ Date: _____

After penetrations are sealed, FMS - PM or Maintenance Dept, and the Responsible Person shall inspect the area to ensure compliance with the required standards, make any corrections, and sign off on lines below.

Signature of **Responsible Person** Filing for Permit: _____

Signature **FMS PM or Maintenance Staff:** _____

Signature of **COTR:** _____

Submit fully signed Copies to Contractor, COTR, Safety Officer, and FMS - PM and/or Maintenance Dept.

HOT WORK POLICY

1. PURPOSE

To establish policy and procedures for cutting, welding and other hot work operations in non-designated areas; to assure that all supervisors, employees and contractors take proper precautions when any cutting, welding or other hot work is to be accomplished; and, assure that all work is done in a safe manner with limited risk to patients, staff and visitors.

2. POLICY

a. To minimize the risk of fires during construction, alteration, demolition operations or making repairs while performing hot work, such as cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipe or any other similar work.

b. Procedures and controls are hereby established to control all cutting and welding operations conducted in areas not specifically designated for this type of operation. Designated welding areas include the Machine Shop, the Pipefitting Shop, the Motor Transportation Shop and the Air Conditioning Shop.

3. RESPONSIBILITIES

a. Chief, Engineering Service, is responsible for the overall hazardous operation involving cutting and welding operations within the Medical Center complex.

b. Construction Project Managers, Contracting Officers Technical Representatives (COTR) and Engineering Service Supervisors are responsible for:

(1) Instructing employees/contractors on proper procedures for cutting, welding and other hot work in the Medical Center, and to ensure that the procedures in this policy are followed.;

(2) Discussing with Nurse Managers/designees of the area the possibility of some smoke, dust, noise, etc. This is done prior to the start of any hot work operation to assure care providers that every precaution is being taken to minimize any risks to patients and staff;

(3) Providing this policy requirement to vendors/construction contractors before work begins (i.e., preconstruction meetings) in contracts involving cutting and/or welding;

(4) Ensuring that all contractors follow the procedures in this policy;

2.

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(5) Approving cutting, welding and other hot work operations in areas not specifically designed or approved for such processes, and signing the hot work permit before work begins. Hot work permits can be issued and signed by designated Project Managers, designated COTRs, designated Engineering Service Supervisors or Environmental Safety and Health Department Personnel.

c. Contractors are responsible for instructing their employees on the requirements of this policy.

d. Employees will ensure that authorization and permits are obtained for cutting, welding and other hot work operations and that conditions are safe.

e. Should a fire watch be required during operations, a competent person who is knowledgeable and capable of operating the fire extinguisher shall have one available at the job site and shall monitor the job through its entirety.

4. DEFINITIONS

Hot work operations include cutting, welding, brazing, soldering, thawing pipe, grinding, or other spark or flame producing operation. Any process that involves an open flame used temporarily for repair or temporary heating is considered a hot work operation. The use of a portable engine for temporary power is also considered a hot work operation.

5. PROCEDURES

a. Cutting, welding and other hot work shall not be permitted in the following areas:

(1) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dust with air).

(2) In areas not authorized by Occupational Health and Safety.

(3) In buildings equipped with a sprinkler system while the sprinkler system is impaired.

b. Upon issuance of a hot work permit:

(1) An Outlook email must be sent out to the "Hot Work Permit Users Group" by the VA responsible official. At a minimum, the "Hot Work Permit Users Group" shall consist of the Chief, FMS; Associate Chief, FMS; Maintenance Supervisor; Safety Manager and Supervisor, Environmental Safety, Health & EM Department.

3.

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(2) The permit must be kept on the site of the hot work procedure, and be made available to the VA Medical Center Auditing Official upon request. At the end of the hot work procedure, the permit should be returned to the authorizing official, and forwarded to the Occupational Health and Safety Department.

d. The Safety Officer, COTR and Engineering Service Supervisors shall have the authority to stop cutting, welding and other hot work operations that are being accomplished without a permit and those operations that do not meet the standards set forth in National Fire Protection Association Standard (NFPA) 51B.

e. When work cannot be moved practically, the work area will be made fire-safe by removing or covering combustibles within range of any possible sparks.

f.. The area around any operation will be cleared of dust or lint to exceed the possible range of sparks by three (3) feet.

g.. The fire watch will be designated and present with an approved fire extinguisher for the duration of the operation and for thirty (30) minutes after the operation is completed.

h. When cutting or welding overhead, an approved fire blanket will be placed below to cover the area affected.

i. Upon completion of any operation, an inspection will be made for hot materials by the fire watch individual before securing the area. Occupants in the area will be informed that the operation is complete and the area is safe.

5. REFERENCES

NFPA 241 and 51B.

JACK BELIVEAU
Chief, Facilities Maintenance Service

Attachments: A HOT WORK PERMIT

DISTRIBUTION:

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HOT WORK PERMIT

For Cutting, Welding, Soldering, Brazing With Portable Gas or Arc Equipment

Date	
Building	Number
Department	Floor
Work to be done:	
Is fire watch required?	Permit expires
The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work.	
<i>Signature of Approving Official</i>	
Time Started	Time Finished

ATTENTION

Before approving any hot work permit, the approving official or designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51 B.

PRECAUTIONS	Sprinklers in service. Cutting and welding equipment in good repair.
WITHIN 35 FT. OF WORK	Floor swept clean of combustibles. Combustible floors wet down, covered with damp sand, metal or other shields. No combustible materials or flammable liquids. Combustibles and flammable liquids protected with covers, guards or metal shields. All wall and floor openings covered. Covers suspended beneath work to collect sparks.
WORK ON WALLS OR CEILINGS	Construction noncombustible and without combustible covering. Combustibles moved away from the opposite side of wall.
WORK ON ENCLOSED EQUIPMENT (tanks, containers, ducts, etc.)	Equipment cleaned of all combustibles. Containers purged of flammable vapors.
FIRE WATCH (If necessary)	To be provided during and 30 minutes after operation. Supplied with fire extinguisher and/or small hose. Trained in the use of the equipment and in sounding the fire alarm.

FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.
<i>Signature of Approving Official</i>

Providence VAMC

HOT WORK PERMIT

For Cutting, Welding, Soldering, Brazing With Portable Gas or Arc Equipment

Date	
Building	Number
Department	Floor
Permit Holder or Contractor:	Phone:
Work to be done:	
Is fire watch required?	Permit expires
The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work.	
Signature of Approving Official	
Printed Name	
Time Started	Time Finished

ATTENTION

Before approving any hot work permit, the approving official or designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51 B.

PRECAUTIONS	
	Sprinklers in service. Cutting and welding equipment in good repair.
WITHIN WORK AREA	Floor swept clean of combustibles. Combustible floors wet down, covered with damp sand, metal or other shields. No combustible materials or flammable liquids. Combustibles and flammable liquids protected with covers, guards or metal shields. All wall and floor openings covered. Covers suspended beneath work to collect sparks.
WORK ON WALLS OR CEILINGS	Construction noncombustible and without combustible covering. Combustibles moved away from the opposite side of wall.
WORK ON ENCLOSED EQUIPMENT (tanks, containers, ducts, etc.)	Equipment cleaned of all combustibles. Containers purged of flammable vapors.
FIRE WATCH	To be provided during and 30 minutes after operation. Supplied with fire extinguisher and/or small hose. Trained in the use of the equipment and in sounding the fire alarm.

FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.	
Signature of Permit Holder	Date
Signature of Approving Official	Date

Providence VA Medical Center

HOT WORK PERMIT

For Cutting, Welding, Soldering, Brazing With Sparking, Portable Gas or Arc Equipment

Date _____	
Building _____	Number _____
Department _____	Floor _____
<i>Permit Holder or Contractor:</i> _____ <i>Phone:</i> _____ Work to be done: _____ 	
Is fire watch required? _____	Permit expires _____
The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work.	
<i>Signature of Approving Official</i> _____	
<i>Printed Name</i> _____	
Date/Time Started _____	Date/Time Finished _____

ATTENTION

Before approving any hot work permit, the approving official or designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51 B.

PRECAUTIONS	Sprinklers & fire alarms in service. Cutting and welding equipment in good repair.
WITHIN WORK AREA	Floor swept clean of combustibles. Combustible floors wet down, covered with damp sand, metal or other shields. No combustible materials or flammable liquids. Combustibles and flammable liquids protected with covers, guards or metal shields. All wall and floor openings covered. Covers suspended beneath work to collect sparks.
WORK ON WALLS OR CEILINGS	Construction noncombustible and without combustible covering. Combustibles moved away from the opposite side of wall.
WORK ON ENCLOSED EQUIPMENT (tanks, containers, ducts, etc.)	Equipment cleaned of all combustibles. Containers purged of flammable vapors.
FIRE WATCH	To be provided during and 30 minutes after operation. Supplied with fire extinguisher and/or small hose. Trained in the use of the equipment and in sounding the fire alarm.

FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.	
<i>Signature of Permit Holder</i> _____	
<i>Date</i> _____	<i>Signature</i> _____
<i>Date</i> _____	<i>Signature</i> _____
<i>Date</i> _____	<i>Signature</i> _____
<i>Date</i> _____	<i>Signature</i> _____
<i>Date</i> _____	<i>Signature</i> _____

Signature of Approving Official: _____

Date: _____

ATTACHMENT I

Providence VA Medical Center - Infection Control Construction Permit

Location of Construction:	Project No. & Title:
VA Project Manager:	Project Start Date :
Contractor:	Estimated Duration:
Contractor Superintendent:	Permit Expiration Date:

Type of Construction _____ Pt Risk Group _____

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

Circle Class of Precautions Necessary for this Project

CLASS I	<ol style="list-style-type: none"> Execute work by methods to minimize raising dust and fumes from interior and exterior construction operations. Water mist work surfaces to control dust Immediately replace a ceiling tile displaced for visual inspection. Use travel routes that minimize exposure of patients to construction workers, materials, tools and equipment. Schedule utility interruptions during periods of low hospital activity
CLASS II	<p>In addition to precautions listed for Class I above:</p> <ol style="list-style-type: none"> Provide active means to prevent airborne dust from dispersing into atmosphere. HEPA vacuum upper surfaces of ceiling tiles prior to removal Seal unused doors with duct tape. Block off and seal air vents. Place adhesive walk-off mats at entrance and exit of work areas. Seal or isolate HVAC system in areas where work is being performed. HEPA vacuum work surfaces and containers before removing from the work area HEPA vacuum worker clothing, tools, materials, and equipment before leaving the work area
CLASS III	<p>In addition to precautions listed for Classes I and II above:</p> <ol style="list-style-type: none"> Install critical barriers at all openings to the work area Isolate HVAC system in area where work is being done to prevent contamination of duct system. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. Seal holes, pipes, conduits, and punctures within the work area using fire-safe, impermeable materials. Construct anteroom contiguous with work area and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site. Contain construction waste before transport in tightly covered containers. Cover transport receptacles or carts. Tape covering to container to seal all joints. Do not remove barriers from the work area until the completed project is thoroughly cleaned by the VA's Environmental Services Department and inspected by the VA
CLASS IV	<p>In addition to precautions listed for Classes I , II and III above:</p> <ol style="list-style-type: none"> No work is permitted in areas occupied by patients. All personnel entering work site are required to wear head covers, shoe covers and coveralls. Head covers, shoe covers and coveralls must be changed within the anteroom each time the worker exits the work area.

Infection Control _____ Date _____

VA Project Manager _____ Date _____

Chief, Facilities Management _____ Date _____

VA MEDICAL CENTER

Infection Control Program

INFECTION CONTROL FOR CONSTRUCTION WORKERS

WHY INFECTION CONTROL IS IMPORTANT

Hospital-acquired infections (nosocomial) affect 5 percent of all patients admitted to hospitals in the United States and can cause significant illness or even death. Not all of these infections are preventable; however, studies show that up to 32 percent of hospital acquired infections can be prevented when hospitals employ an active and effective infections control program. Hospitals patients are at risk for infection because the stresses of illness and invasive treatments weaken their immune system. In general, healthy adults who are to be at work do not have the same risk for acquiring infections.

Our Infection Control Program is designed to identify and control situations that carry an increased risk for infection and to provide for a safe and healthful environment for patients and staff. During the construction project, you may be asked to do some things a bit differently to ensure that the environment is maintained as safe as possible for all. This information was developed through collaboration with the Infection Control Coordinator, Chief FMS, Safety Officer and Industrial Hygienist to help in explaining infection control aspects of construction in the hospital setting.

DUST CONTROL POLICY

- ◆ Determine if the HVAC system includes return air from the construction area. If so, divert to exhaust if possible, add filtering to remove dust before it enters the return air system, or blocking supply and return vents.
- ◆ Install impervious barriers from floor to floor slab above and wall to wall using framing, clips and duct tape as required to maintain and secure the barrier seal.
- ◆ Report disruptions such as holes in the barrier and interruptions in the seal to the Project Manager immediately.
- ◆ Place the “air moving and filtration device” into the containment area and operate to remove dust particles from the air.
- ◆ Negative air pressure will always be maintained in the construction site at all times during construction.
- ◆ If work is in an extremely sensitive area such as the Operating Room, double barriers may be required.

- ◆ Project site must be completely contained before work begins and all penetrations into the construction site must be sealed. Windows must be closed and air ducts shut down or taped.
- ◆ Anterooms (consisting of confined space beyond the barriers) will be provided at entrances to the work area to contain debris and provide an area where workers can remove protective clothing or vacuum off personal clothing except when exiting directly to the outside of the building.
- ◆ Walk-off mats will be at entrances to work areas during construction.
- ◆ Traffic routes will be pre-determined and traffic to and from the construction site will be minimized.

ENVIRONMENTAL CLEANING POLICY

- ◆ Any dust tracked outside the barriers must be removed immediately as it accumulates.
- ◆ All cleaning in the construction area will be by damp method or HEPA filtered vacuum.
- ◆ Debris will be removed by a pre-determined route and transported in clean, covered containers.
- ◆ At the end of each construction shift, construction personnel will do a thorough clean up of the area.
- ◆ After inspection, the contractor will remove barriers.
- ◆ Environmental Services will do a thorough final cleaning.

Thank you for participating in our effort to provide a safe hospital environment. If you have concerns or questions about infection control, please call the Infection Control Office at extension 3608.

**VA MEDICAL CENTER
INFECTION CONTROL PROGRAM**

INFECTION CONTROL COMPLIANCE CHECKLIST

Project: _____ Date: _____

Time Start: _____ Time End: _____

The following are checked at least daily during demolition and/or construction:

1. Barrier containment completed before construction began.
2. Negative air pressure at construction site was monitored and recorded, at least daily, during construction work.
3. Construction area air exhausted directly outside or HEPA filtered to remove dust before the return to the HVAC system.
4. Air moving and HEPA filtration device placed into the construction area to remove and prevent the escape of dust and fungal particles.
5. All construction holes, pipes, conduits, punctures and/or exposures appropriately sealed.
6. Construction workers put on coveralls for entering the work site or vacuum off work clothes with a HEPA vacuum cleaner prior to exiting the work area.
7. Work surfaces water-misted to control dust while cutting.
8. Dust mats placed at entrance to work area at all times.
9. Workers wore clean shoe covers each time they exited the work area to travel to other areas of the facility (or no travel to other areas was necessary).
10. Dust tracked outside the barrier was removed immediately by damp-mop method or with HEPA filtered vacuum cleaners.
11. Debris was transported from the construction area by the pre-determined route in clean containers with tight-fitting covers.
12. Designated debris routes were cleaned by damp-mop method or with HEPA filtered vacuum cleaners prior to being returned to patient or staff use.
13. Any disruption or violation of the containment barrier integrity was immediately reported to the Project Manager.
14. The freight elevator should not transport supplies or contractors to the 7th floor. All contractors will exit on the 6th floor to minimize traffic going to the 7th floor.

Above items checked (by initials) at the following times:

Compliance Checklist Submitted By: _____

COMMENTS: _____

**SECTION 01 21 00
ALLOWANCES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor or additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

1.2 RELATED WORK:

- 1. FAR PART 52 AND VAAR PART 852 for procedures for adjustment in contract price and time.
- 2. FAR PART 52 AND VAAR PART 852 and 01 22 00, UNIT PRICES for procedures for using unit prices.
- 3. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise VA COTR of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At VA COTR's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by VA COTR from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form used for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

VAMC Providence FCA Renovate Lobbies and Corridors
VA Project No. 650-08-104
PAI Project No. 35918.00

1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials selected by VA COTR under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by VA COTR under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Government reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Quantity Allowance: Section 03 54 16, Hydraulic Cement Underlayment; self-leveling underlayment. Include quantity for full coverage underlayment application at an average thickness of 9.5 mm (3/8 inch) at all concrete slab areas scheduled to receive finish flooring or floor coatings.

--- E N D ---

SECTION 01 22 00
UNIT PRICES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section includes administrative and procedural requirements for unit prices.

1.2 RELATED WORK:

1. FAR PART 52 AND VAAR PART 852 for procedures for adjustment in contract price and time.
2. Section 01 21 00, ALLOWANCES for procedures for using unit prices to adjust quantity allowances.
3. Divisions 02 through 49 Sections for items of Work covered by unit prices.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to BIDDING REQUIREMENTS, FAR PART 52 AND VAAR PART 852 and individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Flooring Underlayment Without Aggregate Fill

1. Description: Work associated with providing self-leveling underlayment without aggregate fill, according to Section 03 54 16, Hydraulic Cement Underlayment.
2. Unit of Measurement: Per cubic foot of hydraulic cement underlayment.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 ALLOWANCES.
4. Unit Price Applicability: Unit prices shall be used as basis for adjusting contract sum for quantity of work resulting from unknown conditions and differing from the quantity of work indicated in the Contract Documents, including indicated quantity allowances.

B. Unit Price No. 2: Flooring Underlayment With Aggregate Fill

1. Description: Work associated with providing self-leveling underlayment with aggregate fill, according to Section 03 54 16, Hydraulic Cement Underlayment.
2. Unit of Measurement: Per cubic foot of hydraulic cement underlayment.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 ALLOWANCES.
4. Unit Price Applicability: Unit prices shall be used as basis for adjusting contract sum for quantity of work resulting from unknown conditions and differing from the quantity of work indicated in the Contract Documents, including indicated quantity allowances.

C. Unit Price No. 3: Typical Corridor Door Replacement

1. Description: Work associated with providing a typical single-leaf replacement door located in a corridor, according to Section 08 14 00, INTERIOR WOOD DOORS and Section 08 71 00, DOOR HARDWARE. Provide door, hardware, and other work associated with each door.
2. Unit of Measurement: Each.
3. Unit Price Applicability: Unit prices shall be used as basis for adjusting contract sum for quantity of work differing from the quantity of work indicated on the Contract Documents.

D. Unit Price No. 4: Typical Lobby Smoke Door Replacement

1. Description: Work associated with providing typical double-leaf replacement smoke door pairs located in the elevator lobbies, according to Section 02 41 00, SELECTIVE DEMOLITION, Section 08 11 13, HOLLOW METAL FRAMES, Section 08 14 00, INTERIOR WOOD DOORS and Section 08 71 00, DOOR HARDWARE. Provide demolition, frame, door, hardware, and other work associated with each door pair.
2. Unit of Measurement: Each.
3. Unit Price Applicability: Unit prices shall be used as basis for adjusting contract sum for quantity of work differing from the quantity of work indicated on the Contract Documents.

E. Unit Price No. 5: Typical Fire Stair Door Replacement

VAMC Providence FCA Renovate Lobbies and Corridors
VA Project No. 650-08-104
PAI Project No. 35918.00

1. Description: Work associated with providing a typical replacement fire stair door located in exit stairway enclosures, according to Section 08 14 00, INTERIOR WOOD DOORS and Section 08 71 00, DOOR HARDWARE. Provide door, hardware, and other work associated with each door.
2. Unit of Measurement: Each.
3. Unit Price Applicability: Unit prices shall be used as basis for adjusting contract sum for quantity of work differing from the quantity of work indicated on the Contract Documents.

--- E N D ---

SECTION 01 23 00
ALTERNATES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section includes administrative and procedural requirements for alternates.

1.2 RELATED WORK:

- 1. FAR PART 52 AND VAAR PART 852 for procedures for adjustment in contract price and time.
- 2. Divisions 02 through 49 Sections for items of Work covered by Alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or 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. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
 - 2. Include as part of each alternate, costs of related coordination, modification, or adjustment to other portions of The Work.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Delete 5th Floor 'A' Wing Scope.
 - 1. Base Bid: Provide all scope items on the 5th floor 'A' wing, beginning at pair of smoke partition doors in the lobby located at CL-5.
 - 2. Alternate: Delete all scope items on the 5th floor 'A' wing, beginning at pair of smoke partition doors in the lobby located at CL-5.
- B. Alternate No. 2A: Replacement Doors, Delete Doors on the 5th floor 'A' Wing Corridor.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings.
 - 2. Alternate: Delete replacement of all doors on the 5th floor 'A' wing, beginning after the pair of smoke partition doors in the lobby located at CL-5, with the exception of said smoke doors and fire exit stair enclosure doors.
- C. Alternate No. 2B: Replacement Doors, Delete Fire Stair Exit Enclosure Door Replacement.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings.
 - 2. Alternate: Delete replacement of all doors to the Fire Stair Exit Enclosures on all floors in all wings.
- D. Alternate No. 2C: Replacement Doors, Delete Lobby Smoke Door Replacement.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings.
 - 2. Alternate: Delete replacement of all pairs of smoke control compartment doors at the elevator lobby, each leading to the "A", "B" and "C" wing corridors.
- E. Alternate No. 2D: Replacement Doors, Delete Doors on the 6th floor 'C' Wing Corridor.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings
 - 2. Alternate: Delete replacement of all doors on the 6th floor 'C' wing, beginning after the pair of smoke partition doors in the lobby with the exception of said smoke doors.
- F. Alternate No. 2E: Replacement Doors, Delete Doors on the 3rd floor 'C' Wing Corridor.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings
 - 2. Alternate: Delete replacement of all doors on the 3rd floor 'C' wing, beginning after the pair of smoke partition doors in the lobby with the exception of said smoke doors.
- G. Alternate No. 2F: Replacement Doors, Delete Doors on the 2nd floor 'C' Wing Corridor.
 - 1. Base Bid: Provide all replacement doors as indicated on Drawings
 - 2. Alternate: Delete replacement of all doors on the 2nd floor 'C' wing, beginning after the pair of smoke partition doors in the lobby with the exception of said smoke doors.
- H. Alternate No. 2G: Replacement Doors, Delete Doors on the Basement floor 'C' Wing Corridor.

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1. Base Bid: Provide all replacement doors as indicated on Drawings
 2. Alternate: Delete replacement of all doors on the Basement floor 'C' wing, beginning after the pair of smoke partition doors in the lobby with the exception of said smoke doors.
- I. Alternate No. 3A: Delete Replacement for Portion of 2nd Floor Laboratory Room Ceiling Panels.
1. Base Bid: Provide replacement of ceiling panels in the 2nd floor laboratory rooms, located between CL-CG to CL-GN and CL-1C and CL-8C.
 2. Alternate: Delete replacement of ceiling panels in the 2nd floor laboratory rooms, located between CL-CG to CL-GN and CL-1C and CL-8C. As part of this Alternate, do not delete complete replacement of the corridor ceilings in this area.
- J. Alternate No. 3B: Delete Complete Replacement for Portion of 2nd Floor Corridor Ceilings.
1. Base Bid: Provide complete replacement of corridor ceilings abutting the 2nd floor laboratory, located between CL-CG to CL-GN and CL-1C and CL-8C
 2. Alternate: Delete complete replacement of corridor ceilings abutting the 2nd floor laboratory, located between CL-CG to CL-GN and CL-1C and CL-8C.

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SECTION 01 32 16.15
PROJECT SCHEDULES (Small Projects – Design/Bid/Build)

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal shall include:
 - 1. The name and address of the proposed consultant.
 - 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 - 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents. These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.
- B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:

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1. Notify the Contractor concerning his actions, opinions, and objections.
 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

1.6 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 – 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 – 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
1. Show activities/events as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - 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 Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.

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- d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
 - 2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
 - 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
 - 4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 - 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
- 1. The appropriate project calendar including working days and holidays.
 - 2. The planned number of shifts per day.
 - 3. The number of hours per shift.
- C. Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- D. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COTR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.
- E. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.
- 1.8 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 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

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

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
 - 1. Actual start and/or finish dates for updated/completed activities/events.
 - 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 - 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 - 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 - 5. Completion percentage for all completed and partially completed activities/events.
 - 6. Logic and duration revisions required by this section of the specifications.
 - 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the Contractor and Contracting Officer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the Contracting Officer. 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 Contracting Officer within fourteen (14) calendar days of completing the regular schedule update. Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.
- D. Following approval of the CPM schedule, the VA, the 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. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
 - 1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 - 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 - 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
 - 1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
 - 2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 - 3. The schedule does not represent the actual prosecution and progress of the project.
 - 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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

- A. Refer to SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91).
- B. 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.
- C. 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:
 - 1. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
 - 2. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - 3. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- D. 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. Provide electronic submittals unless indicated otherwise. Electronic submittals shall be digitally signed by the Contractor using a Portable Document Format (PDF) writer program.
 - a. Comply with security, legal, and other procedures of both the Medical Center and Architect-Engineer (A-E) for use of electronic submittals.
 - 2. Provide paper copy submittals for the following types of submittals:
 - a. Application for Payment and Schedule of Values.
 - b. Where specifically indicated in other specification sections.
 - 3. Provide both electronic submittals and paper copy submittals for the following types of submittals:
 - a. Contractor's Construction Schedule.
 - b. Submittals Schedule.
 - c. Shop drawings larger than 279 mm by 432 mm (11 by 17 inches).
 - d. Coordination drawings larger than 279 mm by 432 mm (11 by 17 inches).
 - e. Samples.
 - f. Construction photographs.
 - g. Where specifically indicated in other specification sections.

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4. Pre-Construction Submittals: Unless otherwise approved by Contracting Officer, no construction work shall commence until approval of pre-construction submittals by COTR. Provide the following submittals within 10 days after contract award, except submit within fewer days where required elsewhere in the Contract Documents:
 - a. Security Plan.
 - b. Safety Plan.
 - c. Site Logistics Plan.
 - d. ILSM Plan.
 - e. ICRA Plan.
 - f. Subcontractor List.
 - g. Scheduling Consultant Qualifications.
 - h. Preliminary Bar Chart Construction Schedule.
 - i. Schedule of Values.
 - j. Initial Submittals Schedule.
 - k. Certificates of Insurance.
 - l. Surety Bonds.
 - m. Quality Control Plan.
 - n. Construction Waste Management Plan.
- E. Submittals Schedule: The Contractor shall prepare and keep current, for the COTR's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect-Engineer and COTR reasonable time to review submittals.
 1. Submittals Schedule Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - a. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - b. Indicate dates when final selection of products or systems described by an allowance must be provided to allow sufficient time for submittal preparation.
 - c. Indicate dates when mockups require final approval prior to fabrication of items contained in submittals.
 - d. Initial Submittals Schedule: Submit concurrently with preliminary construction schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication. Submit within time limits indicated for 'Initial Submittals'.
 - e. Final Submittals Schedule: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
 - f. Updates: Where warranted due to changes in construction schedule, provide updates to submittal schedule with updates of Contractor's Construction Schedule.
 2. Submittals Schedule Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category (action, informational, closeout).
 - d. Differentiate submittals requiring review by Architect-Engineer from those requiring only review of COTR or Contracting Officer.
 - e. Name of subcontractor.
 - f. Description of the Work covered.

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- g. Scheduled date for COTR's final release or approval.
- F. Unless required otherwise by Contracting Officer, submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by COTR on behalf of the Contracting Officer.
- G. Contractor shall assign a file number to submittals sequentially numbered by CSI section number. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.
 - 1. File number shall include specification section number, sequence number of submittal item for particular specification section, and indication of initial submittal or resubmittal of item.
 - a. File Number Example: Submittal number 078100-003-00 for initial submittal of third item submitted for section 07 81 00. If resubmission is required, use submittal number 078100-003-R1 for first resubmittal of same item.
 - 2. PDF file names for electronic submittals shall start with file number followed by title of submittal. Any other identifiers used by Contractor shall be placed at end of PDF file name.
 - 3. Attach standard VA submittal form as cover sheet for each submittal item.
- H. 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 by Contracting Officer, adjustment in contract price and time will be made in accordance with CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88).
- I. 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.
- J. Submittals must be submitted by Contractor only. Electronic submittals shall be posted directly to a designated File Transfer Protocol (FTP) site specifically established for Project, or subject to approval of Contractor Officer, may be sent by electronic mail (e-mail). Paper copy submittals shall be shipped prepaid. Subject to approval of Contracting Officer, if Contractor is unable to scan large file submittals electronically, Contractor may provide a paper copy submittal. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
 - 1. Submit physical samples in quadruplicate.. Submit paper copy submittals in quadruplicate, except where a greater number is specified.
 - 2. Submittals will receive consideration only when stamped and covered by a transmittal letter and standard VA submittal form, each signed by Contractor. Letter shall be sent electronically or via first class mail 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.

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- a. 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.
 - b. 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.
 - c. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- K. If submittals or samples have been disapproved, resubmit new submittal or samples as soon as possible but not later than 5 working days after notification of disapproval. Such new submittal or samples shall be marked "Resubmittal" or "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- L. Approved samples will be kept on file by the COTR at the site until completion of contract, at which time such samples may be delivered to Contractor, upon request and at Contractor's expense, 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.
- M. Submittals, 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 submittals shall be stamped and signed by Contractor certifying to such check.
1. For each paper copy submittal 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. Physical samples shall be marked with project number and submittal number.
 5. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each submittal to accommodate approval or disapproval stamp.
 6. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 7. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 8. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- N. Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for review to Architect-Engineer (A-E):
- Payette Associates, Inc.
290 Congress Street, Fifth Floor
Boston, MA, 02210-1005
1. Concurrent Review: For submittals requiring review by A-E's consultants, send required copies of submittal to consultant.

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- a. Electronic Submittals: For electronic submittals requiring review by A-E's consultants, post or send required copies of submittal to both consultant and A-E. Consultant will return submittal to A-E for A-E review.
 - b. Paper Copy Submittals: For paper copy submittals requiring review by A-E's consultants, send required copies of submittal directly to consultant and simultaneously send a copy of the transmittal to A-E. Consultant will return submittal to A-E for A-E review.
- 2. Submittal routing requirements for concurrent reviews will be reviewed at pre-construction meeting. Concurrent review requirements will be generally consistent with the following:
 - a. Division 2 abatement submittals are to be transmitted directly to the A-E's Asbestos Consultant.
 - b. Division 8 door hardware submittals are to be transmitted directly to the A-E's Door Hardware Consultant.
 - c. Divisions 22, 23, and 26 submittals shall be transmitted directly to the Architect's M/E/P/FP/T Consultant.
- O. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COTR.

--- E N D ---

SECTION 01 35 43
ENVIRONMENTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY OF THE WORK

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

- A. Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work.

1.1.2 RELATED WORK UNDER OTHER SECTIONS

- A. Asbestos Remediation.

1.1.3 HAZARDOUS MATERIALS PROCEDURES

- A. Asbestos:
 - 1. Asbestos Materials Exist On-Site: There are accessible and inaccessible asbestos containing materials (ACM) in the existing areas scheduled for renovation. ACM affected by this project are included under this contract. The General Contractor shall formally notify each subcontractor that there are ACM existing. Hidden ACM may only be found during Demolition.
 - 2. Unknown and inaccessible ACM: During the General Contractor and/or the Demolition work of the Contract, it is possible that previously unknown asbestos materials may be discovered in currently concealed locations.
 - 3. Notification: If the General Contractor and/or the Demolition Contractor discover or encounter any ACM during the performance of the work, the General Contractor and/or the Demolition Contractor shall immediately:
 - a. Stop work, notify the Owner and Clerk of the Works about the presence of suspect ACM and request instructions for proper action, and
 - b. Take whatever steps and measures are necessary to reduce, control or eliminate the risk of exposure of workers and the public to the ACM.
 - 4. Responsible Person On-Site: The General Contractor and/or the Demolition Contractor shall designate one of its senior on-site employees to be in charge of coordination between the Architect, the General Contractor, and all subcontractors with respect to hazardous materials issues.
 - 5. Responsibility for Hazardous Material Discovery: It is the sole responsibility of the General Contractor and its Subcontractors to undertake whatever measures, methods or procedures are necessary, required or otherwise appropriate to safeguard the health and safety of all workers and members of the public with respect to identification and discovery of previously unknown hazardous materials during the work of the Project.
 - 6. Indemnification: To the fullest extent permitted by law, the General Contractor and/or the Demolition Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to, attorneys' fees arising out of or relating to the performance of the Work, including the discovery or identification of any hazardous materials, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom; and is caused in whole or in part by any negligent act or omission of the General Contractor, any Subcontractor, anyone directly or

indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

B. Lead:

1. The General Contractor or Demolition Contractors shall be made aware that Lead Based Paint exists on painted surfaces.
2. It is the General Contractor or Demolition Contractors responsibility to either test painted surfaces or assume that all existing painted surfaces are coated with Lead Paint. All costs for testing shall be the responsibility of the General Contractor or Demolition Contractors at no additional cost to the Owner.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance and guidelines in such from in which they exist at the time of the work on the Contract and as may be required by subsequent regulations.
4. The General Contractor or Demolition Contractors is solely responsible for means and methods, and techniques used for demolition and lead control. The General Contractor or Demolition Contractors shall collect and control lead contaminated debris and to properly remove and dispose of lead contaminated soil around each building due to demolition activities.
5. The General Contractor or Demolition Contractors shall at his own cost and expense comply with all laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during demolition, prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing and disposing of lead and lead contaminated waste material.
6. The EPA requires demolition debris with lead to be tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine the potential for significant amounts of lead to leach out of the waste. If the results are below the EPA standard (5.0 ppm), the waste may be disposed of in a conventional landfill for demolition debris. If, however, the TCLP results are above the standard, the waste must be disposed of in an EPA approved hazardous waste landfill. The General Contractor or Demolition Contractors shall at own cost and expense perform all required testing of waste by the TCLP. The General Contractor or Demolition Contractors must submit to the Owner copy of tests performed and all waste shipment records prior to disposing of debris. The Owner reserves the right to have own TCLP samples collected to verify results. All disposal costs shall be at the General Contractor or Demolition Contractors responsibility.
7. The following references are cited as current applicable publications. This project is subject to compliance with the all regulations including but not limited to:
 - a. U. S. Department of Labor, Occupational Safety and Health Administration Title 29 CFR 1910.1025 and 29 CFR Part 1926.62.
 - a. U. S Department of Environmental Protection, Resources Conservation and Recovery Act.
9. Where there is a conflict between this section and other applicable regulations, the more stringent requirement shall prevail.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT(NOT USED)

PART 3 – EXECUTION (NOT USED)

End of Section

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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

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

- A. The specifications and standards cited in this solicitation can be examined at the following location:
- B. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Numbers: (202) 461-8217 or (202) 461-8292
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)

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

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

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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
CDC	Centers for Disease Control http://www.cdc.gov

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CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmc.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute http://www.eei.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.et1.com
FAA	Federal Aviation Administration http://www.faa.gov
FCC	Federal Communications Commission http://www.fcc.gov
FGI	Facilities Guidelines Institute http://www.fgiguideines.org
FPS	The Forest Products Society http://www.forestprod.org

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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
IBC	International Building Code (See ICC)
ICBO	International Conference of Building Officials http://www.icbo.org
ICC	International Code Council http://www.iccsafe.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

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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

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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

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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 56 10
DUST AND AIRBORNE CONTAMINANTS CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Generate and submit for Owner-approval, a Dust and Airborne Contaminants Control Work Plan based upon Owner-generated Statement of Requirements and in compliance with requirements stated herein.
- B. Comply with:
 - 1. Dust and airborne contaminants control procedures within the construction Containment Area(s).
 - 2. Levels (classifications) of dust and airborne contaminants control procedures outside of the construction Containment Area(s).
 - 3. Owner's standards including but not limited to the following:
 - a. 'Providence VA Medical Center Construction Safety Manual'.

1.2 RELATED SECTIONS

- 1. Section 01 00 00 GENERAL REQUIREMENTS for general infection prevention measures, general temporary barrier and partition requirements, Owner occupancy requirements, work restrictions, miscellaneous provisions, and reference to Owner standards.
- 2. Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.
- 3. Section 01 73 29 CUTTING AND PATCHING.
- 4. Section 02 41 00 DEMOLITION.
- 5. Section 02 82 11 ASBESTOS ABATEMENT.

1.3 DEFINITIONS

- A. Dust and Airborne Contaminant Producing Activities: These activities include, but are not limited to:
 - 1. Demolition and removal of walls, floors, ceilings, and other finish materials.
 - 2. Demolition of plumbing, mechanical and electrical systems and equipment.
 - 3. Finish operations such as grinding of concrete and other surfaces, sanding, painting, and application of special surface coatings.
 - 4. All routine construction activity which can generate dust.
 - 5. Sitework operations.
- B. Containment Area(s): As determined by the Owner and as indicated on the Owner-approved Dust and Airborne Contaminate Control Work Plan. Includes area of construction, adjacent staging and storage areas, and passage areas for contractors, supplies and waste; includes ceiling spaces above Containment Area(s).

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- C. Occupied Area(s): Area(s) outside of Containment Area(s), currently utilized by the Owner.
- D. Thorough Cleaning: Cleaning of surfaces which become exposed to dust or airborne contaminants that shall be accomplished by the use of either a HEPA filtered vacuum cleaner or a wet mop.
- E. Negative Air Machine: Portable mechanical unit to provide a negative air pressure in the Containment Area(s), as specified in this Section.
- F. Construction 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 which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
- G. Construction Type B - Small scale, short duration activities that create minimal dust. Includes, but is not limited to: installation of telephone or computer cabling; access to pipe chase spaces; cutting of walls or ceilings where dust migration can be controlled.
- H. Construction Type C - Any work, which 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 ductwork or electrical work above ceilings; major cabling activities; and any activity which cannot be completed within a single work shift.
- I. Construction Type D - Major demolition and construction projects. Includes, but is not limited to: activities that require consecutive work shifts; require heavy demolition or removal of a complete ceiling system; and new construction.
- J. Group 1: Lowest Risk Patient Risk Group - Office areas.
- K. Group 2: Medium Risk Patient Risk Group - Cardiology, Echocardiography, Laboratories, Nuclear Medicine, Physical Therapy, Radiology/MRI, Respiratory Therapy.
- L. Group 3: Medium-High Risk Patient Risk Group - Emergency Room, Post-Anesthesia Care Units, Day Surgery, Pharmacy, Endoscopy.
- M. Group 4: Highest Risk Patient Risk Group - 4B (Hem/Onc Unit), Operating Rooms/Sterile Processing, Cardiac Catheterization & Angiography Areas, Dialysis, ICU/CCU/CVT/CVT-I, Med/Surg Nursing Units.
- N. HEPA - High Efficiency Particulate Air.
- O. Level of Infection Control - Class I, II, III or IV, as determined from the IC Matrix.

1.4 PERFORMANCE REQUIREMENTS

- A. The purpose of the infection control procedures are to minimize the risk of infection during construction by maintaining the integrity of the environment, and controlling the spread of dust.
- B. Owner's Responsibilities
 - 1. Verification and approval of Dust and Airborne Contaminant Control Work Plan, inclusive of levels (classifications) of airborne contaminant control in Occupied Area(s).

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2. Statement of Requirements: Description in graphic and written form as required to communicate the above, based on evaluation of the construction area(s) and the impact of the project on patient care and hospital operations in adjacent areas. This statement will be inclusive of the following:
 - a. Baseline for acceptable levels of dust particles and airborne-contaminants in Occupied Area(s).
 - b. Indication of levels of dust and airborne contaminant control required in Occupied Area(s).
3. Testing and monitoring, except where testing and monitoring is indicated as Contractor's responsibility.

C. Contractor's Responsibilities

1. To comply with Owner's standards, applicable codes, and referenced controls and to use installation procedures and methods which satisfy applicable code requirements and referenced controls and procedures.
2. Specific means and methods of achieving and maintaining control of airborne contaminants during construction.
3. Proposed work plan and procedures for control of dust and airborne contaminants, as noted below.
4. Control Work Plan Certification: Provide dust and airborne contaminant control work plan, signed by Contractor and accepted in writing by Owner.
5. Notification: Notify Owner a minimum of 48 hours prior to starting construction activity which might be expected to produce levels of dust and airborne contaminants in Occupied Area(s) so that additional precautions may be taken.
6. Provide dustproof enclosures, warning signs and warning lights to protect the public, the existing building, storage areas and materials or equipment. Enclosures shall be approved by Owner.
7. Other responsibilities indicated in the Contract Documents, unless specifically indicated as the responsibility of another party.

- D. Conduct work by implementing the appropriate level of infection control as required or as noted herein.

- E. Infection Control Matrix (IC Matrix): The following Infection Control Matrix defines the matrix of precautions to be implemented for construction, demolition and renovation. Matching the planned construction type with the patient risk group on the matrix defines the minimum level of infection control required (Class I, II, III or IV).

Risk Level	Construction Activity			
	Type A	Type B	Type C	Type D
Group 1 Lowest Risk	Class I	Class II	Class II	Class III/IV
Group 2 Medium Risk	Class I	Class II	Class III	Class IV
Group 3 High Risk	Class II	Class II	Class III/IV	Class IV
Group 4 Highest Risk	Class II	Class III/IV	Class III/IV	Class IV

- F. Class I:

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1. Execute work by methods to minimize raising dust from construction operations.
2. Immediately replace a ceiling panel or tile displaced for visual inspection.
3. Traffic: Decrease exposure of patients to construction.
4. Water: If necessary, schedule interruptions during low activity.

G. Class II: In addition to precautions for Class I:

1. Provide active means to prevent airborne dust from dispersing into the atmosphere.
2. Water mist work surfaces to control dust.
3. Seal unused doors with duct tape or gaskets. Where installing gaskets, supplement with duct tape where required to comply with requirements.
4. Block off and seal air vents.
5. Place walk-off mats at work areas. Mats must be kept wet with amended water during the work hours to prevent tracking construction dust into surrounding areas.
6. Seal or isolate HVAC system in areas where work is being performed.
7. HEPA vacuum the work surfaces before leaving the work area.
8. HEPA vacuum worker clothing, tools, materials and equipment before leaving the work area.
9. Wipe work surfaces with disinfectant upon completion of work.

H. Class III: In addition to precautions for Class I and II:

1. Install critical barriers at all openings to the work area.
2. Maintain negative air pressure within the work site utilizing HEPA-equipped air filtration units.
3. Construct an entry and exit chamber or vestibule contiguous to the work area.
4. Contain construction waste before transport in tightly covered containers.
5. Cover transport receptacles or carts. Tape covering unless the cart has a solid lid.
6. Do not remove barriers from the work area until the completed project is inspected by the VA Safety Officer and the Infection Control Coordinator.

I. Class IV: In addition to precautions for Class I, II and III:

1. Relocate patients away from construction areas if possible.
2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system.
3. Seal holes, pipes, conduits and punctures into the work space.
4. All workers shall wear cloth or paper coveralls while in the work area(s). Coveralls shall be removed in an entry and exit chamber or vestibule contiguous to the work area before leaving the work area.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submit items required by this section to Resident Engineer and prior to commencement of construction. For any submittals under this section that require approval, that approval shall be provided by the Government and by the Government entities and individuals identified by the Resident Engineer. Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only.

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- C. Progress Schedules (G): Submit work areas and procedure schedules for containment of dust and airborne contaminants. Refer to Section 01 32 16.15 PROJECT SCHEDULES (Small Projects – Design-Bid-Build).
 - D. Dust and Airborne Contaminant Control Work Plan (G): Provide drawings, details and procedural descriptions as necessary to document proposed means of providing the following:
 - 1. Construction of temporary barriers necessary to achieve and maintain control of construction-related dust and airborne contaminants and as required to define the perimeter of Construction Containment Area(s).
 - 2. Compliance with Owner-defined levels (classifications) of dust and airborne contaminants control to be provided in all Occupied Areas outside the construction Containment Area(s).
 - E. Control Work Plan Certification (G): Submit Contractor's Control Work Plan Certification as specified under "Contractor's Responsibilities" in the "Performance Requirements" article.
 - F. Product Data (G):
 - 1. Fungicide: Provide manufacturer's specifications and other data needed to obtain Owner's approval of fungicide specified under Part 2 – Products.
 - 2. Prefabricated Portable Enclosure: Provide manufacturer's specifications and other data required for Owner's approval.
 - 3. Cleaning products.
 - G. Test Reports:
 - 1. Air sampling results.
 - 2. Pressure differential recordings for local exhausts.
 - 3. Written report by air balancer.
 - H. Certificates:
 - 1. Employee training.
 - 2. VAMC Infection Control Construction Permits (G).
 - I. Material Safety and Data Sheets (MSDS): Submit for all materials and products proposed for use on Project.
 - J. Closeout Submittals:
 - 1. Completed daily VAMC Infection Control Compliance Checklist.
 - 2. Construction Inspection Forms.
 - K. Provide additional submittals required by referenced Owner standards.
- 1.6 ENVIRONMENTAL REQUIREMENTS FOR AIRBORNE CONTAMINANTS CONTROL
- A. Control of dust and airborne contaminants, caused by construction activities, is critical in all hospital areas. Contractor shall limit dissemination of airborne contaminants produced by construction-related activities, in order to provide protection of patients, staff, diagnostic operations, building occupants, sensitive procedures and equipment, from possible undesirable effects of exposure to such contaminants.

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1. Dust in ceilings and construction debris contains fungus spores. Construction activities causing disturbance of existing dust, or other airborne contaminants, must be conducted in accordance with requirements specified herein.
 2. Ceilings and walls in Occupied Area(s) and other designated areas in the Hospital must remain undisturbed at all times. If access into the ceiling or walls in Occupied Areas, is required, procedures as described in this Section shall be followed.
- B. Construction personnel are required to attend a preconstruction orientation session as specified herein.

1.7 PROTECTION OF OCCUPIED AREAS

- A. General requirements for dust and airborne contaminant producing activities in Occupied Areas are as follows:
1. Notify the Owner and obtain approval at least 48 hours, or greater if requested by the Owner, prior to commencing work.
 - a. When required by procedures specified herein, obtain an Infection Control Construction Permit.
 2. Provide dust and airborne contaminant control measures in accordance with procedures specified herein and commensurate with level (classifications) of contaminant control as directed by the Owner and as indicated on the Owner-approved Dust and Airborne Contaminant Control Work Plan.
 3. When work is performed in Occupied Area(s), protect existing surfaces from falling debris. Take all necessary precautions to protect the people and spaces below from injury.
 4. When working with fluids, provide a water-tight barrier beneath the work area to catch and retain all spillage.
- B. Refer to PART 3 of these specifications for specific requirements for dust and airborne contaminant producing activities in Occupied Areas.

1.8 CEILING ACCESS REQUIREMENTS IN OCCUPIED AREAS

- A. Notify the Owner and obtain approval for work requiring access to the ceiling in Occupied Areas at least 48 hours before starting work.
- B. If required by the Owner, comply with the following procedures.
1. Work Tag Procedure:
 - a. Attach a completed, approved work tag on the ceiling access area before proceeding with work.
 - b. The work tag shall not be removed until the work is complete.
 - c. All tags issued from Owner shall be returned the same day to the issuing office, after work and cleanup for the day has been completed.
 2. Prior to removal, spray ceiling panels to be removed, and surrounding adjacent panels, with a finely misted solution of water and Owner-approved fungicide to settle dust prior to

panel removal. After removal, spray top of removed panels and top of surrounding adjacent panels.

3. Prior to removal of ceiling panels or tiles, vacuum the top surfaces of ceiling panels or tiles using a HEPA-filtered vacuum.
4. Inform Head Nurse or department manager so that patient room doors near ceiling work will be kept closed while the work is in progress.
5. Owner's Representative shall be contacted for all ceiling access problems.

1.9 QUALITY ASSURANCE

- A. Preconstruction Meeting: Before any construction on site begins, Contractor and personnel are required to attend a preconstruction orientation session held by the Owner for training and instruction on precautions to be taken. Training will help personnel to protect patients and better understand the nature of diseases and problems caused by air borne fungal contaminants generated by construction activities.
- B. A written report from a qualified air balancer shall be submitted confirming specified air velocity whenever enclosure is erected or modified in Containment Area(s). Negative air machines shall be connected to emergency power and run continuously in such areas.
- C. Notification: Provide minimum 48 hours notification to Owner of possible construction activity causing dust or airborne contaminants in Occupied Area(s). Schedule work in occupied area(s) in advance, and outside of standard work hours, if required by the Owner.
- D. All personnel are required to wear N95 respirators, disposable booties and coveralls when working inside the containment. These are to be removed when exiting the work area.
- E. All personnel are to be trained on infection control procedures and work procedures specified in this Section.
- F. Power equipment that generates dust shall have attached dust collection apparatus.

1.10 PROJECT CONDITIONS

- A. Existing Conditions: Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer. Comply with requirements in other specification Sections.

1.11 SEQUENCING AND SCHEDULING

- A. All work shall be coordinated with the hospital infection control office, facility director, safety department, security office and work shall not commence until the Infection Control Construction Permit has been approved by VAMC for that specific work area, including designation of the pre-determined debris removal routes.
- B. Any issue that could have impact on VAMC operations must be reported to the VAMC project representative before commencement. This includes containment breeching, loss of negative pressure, releases of dust or debris into uncontrolled interior building areas, or other issues that could affect infection control procedures.

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- C. Work phasing and breakout of specific work areas shall be in coordination with the Owner's requirements and shall not adversely affect the operations of the Medical Center.

1.12 TESTING

- A. Air Samples: Owner will provide baseline particle counts and conduct periodic air sampling of Occupied Area(s) during construction to monitor effectiveness of containment procedures.
- B. Air Pressure: Using differential pressure monitors, verify the maintenance of negative air pressure in [elevator shafts used for construction and in] Containment Area(s), relative to Occupied Area(s) on a continuous basis.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. HEPA-filtered Negative Air Machines:
 - 1. Units shall include pre-filters, final filters, HEPA filters and filter static pressure gauges.
 - 2. HEPA filters shall be 99.997% efficient at 0.3 micron particle size.
- B. Carpet or Mats: Provide carpets or mats at enclosure entrances, vacuumed or changed as often as necessary to prevent accumulation of dust. At Owner's option and subject to approval of the Government, provide adhesive faced contamination control mats with disposable sheets. All vacuuming shall be with a certified HEPA-filtered vacuum.
 - 1. Minimum size: 914 mm (36 inches) wide by 610 mm (24 inches) deep.
- C. Solution for Misting Tops of Ceiling Tiles:
 - 1. Provide a solution mixture of potable water and an Owner-approved fungicide for use in misting the tops of ceiling tiles being moved or removed in Occupied Area(s).
 - 2. Add fungicide to water in percentage(s) as directed by Owner.
- D. Dust Caps: Block off all existing ventilation ducts within the construction area. Method of capping ducts shall be dust tight and withstand air flow.
- E. Portable Enclosures: Provide portable enclosure for ceiling access in Occupied Area(s) where required by procedures specified herein, or as directed by the Owner. Construct portable enclosure from 4 mil portable polyethylene, enclosing ladder and sealing off opening fitted tight to ceiling, or provide prefabricated unit acceptable to the Owner.
 - 1. Available Products for Prefabricated Enclosure Units:
 - a. Kontrol Kube™ as manufactured by Fiberlock Technologies 150 Dascomb Road, Andover, MA 01810, (800) 342-3755. www.fiberlock.com
 - b. Environmental Containment Unit™ as manufactured by Mintie Corporation, 1114 San Fernando Road, Los Angeles, CA 90065-1126, (800) 964-6843. www.mintie.com
 - c. Or equal.

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- F. Polyethylene: Polyethylene (for protection of surfaces in Occupied Areas) shall be 6 mil fire retardant type listed by Underwriters Laboratories. Provide manufacturer's recommended fire retardant tape.
- G. Door Gaskets:
 - 1. Provide for doors in dust and airborne contaminate control barriers.
 - 2. Head and Jambs: Aluminum housing with neoprene gasket.
 - 3. Door Bottoms: Surface-applied, automatic door bottom with neoprene gasket.
- H. HEPA filtered vacuums.
- I. Duct tape.
- J. Material Requirements for Barrier Construction: Refer to PART 3 of these specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before any demolition or construction begins, a complete field review of all protection areas (airborne contaminant control areas) and policies shall be conducted and work plan revised, if required by Owner.

3.2 PREPARATION

- A. Obtain an Infection Control Construction Permit prior to performing any work of construction types A through D.
 - 1. Removal of a single ceiling panel or tile in a suspended acoustic ceiling for observation purposes only does not require an infection control construction permit.
- B. Isolate existing air handling ductwork, supply and return grilles, and HVAC fresh air intakes using air tight seals.
- C. Coordinate requirements for elevator use with Owner. Elevator use, if permitted, must not impact Medical Center operations. Time and dates of waste load must be identified each day.

3.3 SCHEDULE OF REQUIREMENTS

- A. Baseline levels for dust particles and airborne-contaminants not to be exceeded in Occupied Area(s) are as established by the Owner and stated in the Owner's Statement of Requirements.
- B. Owner may monitor airborne-contaminants in vicinity of project. Whenever safe levels are exceeded, Contractor will be notified to correct conditions immediately in accordance with requirements listed below.
 - 1. Work shall be stopped whenever a hazardous airborne contaminant control deficiency exists in Occupied Areas.
 - 2. The Contractor shall take immediate action to correct all deficiencies.

3.4 DUST AND AIRBORNE CONTAMINANTS CONTROL - GENERAL

A. General Requirements – Exterior:

1. Where extensive dust and dirt-producing activities are performed on, and adjacent to the site, thoroughly wet construction materials and dirt by spraying with water.
2. Direct exhaust from equipment away from building air intakes; assure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants.
3. Trucking access roads shall be cleaned of dirt and debris daily as required by governing agencies and authorities to prevent migration of dust and dirt.
4. Dust must be minimized and controlled to prevent migration of dust and dirt to other areas of the site.

B. General Requirements – Interior

1. Provide and maintain all barriers, filters, ventilation, and removal procedures to maintain specified conditions at Containment Area(s) and Occupied Area(s).
 - a. Take appropriate steps throughout the term of the Project to prevent airborne dust due to the Work. Water shall be applied, wherever practical, to settle and hold dust to a minimum, particularly during demolition and moving of materials. No chemical palliatives shall be used without permission of the Owner's Representative.
 - b. Traffic between Containment Area(s) and Occupied Area(s) shall be kept to a minimum. Keep door to such areas closed at all times. Demolition material and construction debris shall be removed in tightly sealed, covered, rubber tired plastic dump carts. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping. Before leaving area all containers shall be wiped clean to prevent tracking of dust.
 - c. Place carpet or walk-off mats adjacent to entrances, keep them clean or change them daily.
 - d. Hard surface floors in Containment Area(s), and adjacent hallways and passages in Occupied Areas require vacuuming with HEPA-filtered vacuum cleaners and frequent wet-mopping during demolition and construction; protect adjacent carpeted areas with plastic and plywood and vacuum with HEPA-filtered vacuum cleaners.
 - e. All vacuuming outside areas not under negative pressure shall be with a certified, Owner approved, HEPA-filtered vacuum.
 - f. Acoustical ceiling panels, tiles, or ceiling access panels opened for investigation in Occupied Area(s) shall be replaced immediately when unattended.
 - g. Removal of construction barriers and ceiling protection shall be done carefully. If required by the Owner, this work shall be conducted outside of normal work hours.
 - h. Thorough Cleaning: Provide thorough cleaning of new and existing surfaces which become exposed to dust, before the start of Owner's room occupancy.
 - i. Critical barriers are to be installed on all doors and windows and other entrances to the work area.
 - j. Seal all holes, chases, pipe cavities, penetrations, and other perforations before commencing work.
 - k. Disposable personal protection equipment (PPE) shall be removed prior to exiting the construction containment area or work area.
 - l. Minimize traffic between work areas and Owner occupied areas.

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- C. Dust and Airborne Contaminant Control Barriers: Provide temporary barriers to prevent passage of dust and airborne contaminants from Containment Area(s) to Occupied Area(s).
1. Install impervious barriers from floor to ceiling and wall to wall to seal work areas from non-work areas. When work is in an area designated for Class IV protection, install double impervious barriers.
 2. Impervious barriers shall be constructed of non-combustible or fire retardant materials.
 3. Construct temporary sound insulated, dustproof partitions to separate Occupied Area(s) from areas where performing dust and airborne contaminant producing activities. Partitions shall be required at elevator lobbies, shafts, stairwells, floor penetration locations, and other locations separating work areas from occupied areas. Small holes in slabs shall be filled using firestopping as described in Section 07 84 00 FIRESTOPPING.
 - a. Use fire retardant polyethylene for dust barriers if the use of plastic material for barriers is approved by the Government. Use of plastic material in lieu of partitions is at the sole discretion of the Government.
 4. Barrier Partition Construction: Minimum one hour fire rated construction, consisting of Type "X" gypsum wallboard and metal studs. Thickness of wallboard and the type of studs to be used, shall be as required by any of manufacturer's or industry's tests to obtain a 1 hour fire rated wall.
 - a. All door openings within temporary partitions shall be 4 feet wide, unless otherwise indicated, shall have pressed metal frames, 1 ¾ inch thick solid core wood doors, door gasketing, door closer, and lock set. Doors shall have a minimum of C label 3/4 hour fire-rating. Three keys for emergency access shall be furnished to the Resident Engineer.
 - b. Partitions shall be fire stopped and smoke sealed in accordance with the requirements of Section 07 84 00 FIRESTOPPING
 - c. Apply minimum of one coat of paint, color as selected by the Owner, to temporary partitions.
- D. Air Quality Contaminant Control In Containment Area(s): Fasten windows shut, ventilate barricaded construction areas by use of negative air machines exhausted through filters to the outside of building, or to Owner designated areas inside the building.
1. Negative air machines as specified herein shall provide air flow into construction area at not less than 100 fpm at enclosure entrances with all doors fully open.
 2. Provide a minimum of 2 negative air machines in each Containment Area. Vent negative air machines to outside by removing existing windows and replacing them with vented sheet metal panels having fittings for exhaust holes. Provide added local exhaust during welding.
 3. Elevator shafts used for construction shall be placed under negative pressure using similar methods.
 4. Change filters as frequently as necessary for duration of the project to maintain a negative pressure of 0.01 – 0.02 inches of water gauge in the Containment Area. Document compliance by submitting test reports.
 5. Negative air units shall be DOPH tested and certified prior to being placed in service, after a HEPA filter change, and when dropped or damaged or moved extensively.
 6. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent hazardous accumulations of dust, fumes, vapors, or gases.
 7. Use duct-tape or other impenetrable sealant to seal exhaust system ductwork, pipes, joints and ducts.

3.5 DUST AND AIRBORNE CONTAMINANT CONTROL LEVELS IN OCCUPIED AREA(S)

A. General Requirements:

1. Comply with requirement specified for dust and contaminant control levels in areas where directed by the Owner and as indicated in the Owner's "Statement of Requirements" for dust and airborne contaminant control.
2. All work performed outside of Containment Area(s) shall be indicated on the Dust and Airborne Contaminant Control Work Plan, submitted under the requirements of Part 1 of these specifications.

B. Occupied Area(s) Class - I Procedures:

1. General
 - a. Comply with provisions for "Protection of Occupied Areas", and "Ceiling Access Requirements In Occupied Areas" articles in Part 1 of these specifications.
 - b. Comply with provisions of "General Requirements – Interior" heading under "Dust And Airborne Contaminants Control – General" article under Part 3 of these specifications.
 - c. Comply with indicated general requirements.
2. Comply with provisions for Class I under 'Performance Requirements' article in Part 1 of these specifications.

C. Occupied Area(s) Class – II Procedures:

1. Comply with procedures described under Class – I Procedures.
2. In addition to Class I procedures, comply with provisions for Class II under 'Performance Requirements' article in Part 1 of these specifications.
3. Upon Completion:
 - a. Wipe work surfaces with disinfectant
 - b. Wet-mop with disinfectant or vacuum with HEPA-filtered vacuum before leaving the area.
 - c. Remove isolation of HVAC system in area(s) where work was performed.

D. Occupied Area(s) Class – III Procedures:

1. Comply with procedures described under Class – II Procedures.
2. In addition to Class I and II procedures, comply with provisions for Class III under 'Performance Requirements' article in Part 1 of these specifications.
3. Upon Completion: In addition to Class I and II procedures, comply with the following:
 - a. Do not remove barriers from work area until completed project is inspected by the VA Safety Officer and the Infection Control Coordinator, and is thoroughly cleaned by Housekeeping.
 - b. Remove barrier materials carefully to minimize risk of spreading dust and debris associated with construction

E. Occupied Area(s) Class – IV Procedures:

1. Comply with procedures described under Class – III Procedures.

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2. In addition to Class I, II, and III procedures, comply with provisions for Class IV under 'Performance Requirements' article in Part 1 of these specifications.
3. Upon Completion: Comply with requirements in Class I, II, and III procedures.

3.6 FIELD QUALITY CONTROL

A. Inspection:

1. Conduct daily inspections using the VAMC Infection Control Compliance Checklist and Infection Control Construction Inspection Form.
2. Continuously monitor and document negative pressure levels. Maintain a written log of negative pressure levels measured to include date and time of the measurement. Notify VAMC representatives immediately if levels exceed indicated thresholds.
3. All barriers and HEPA filtered negative pressure are to remain in place until clearance has been obtained from VAMC representatives.

B. Tests:

1. Air Pressure: Using differential pressure monitors, verify the maintenance of negative air pressure in elevator shafts used for construction and in Containment Area(s), relative to Occupied Area(s) on a continuous basis.
2. VAMC representatives may conduct post abatement and during abatement sampling for dust, mold spores and surface contamination. Sampling may be conducted for dusts outside the work area to assess impact.
 - a. Air Samples: VAMC representatives may provide baseline particle counts and conduct periodic air sampling of Occupied Area(s) during construction to monitor effectiveness of containment procedures.

3.7 CLEANING AND DISPOSAL

- A. The construction area and adjacent areas are to be kept in a clean and sanitary manner, using damp methods and HEPA filtered vacuuming.
 1. Dry sweeping is not acceptable.
- B. Dust tracked outside of the barriers must be removed immediately and as it accumulates.
- C. Surfaces are to be cleaned daily or more frequently if needed with VAMC approved cleaning products.
- D. Do not allow standing water to accumulate in work areas. Accidental spills must be cleaned up immediately. Remove damaged, wet porous materials within one hour of spill.
- E. Water damaged areas scheduled for demolition shall be removed first, under HEPA filtered exhaust and containment, with the waste promptly bagged, to reduce aerosol of microbial agent/fungi/spore from potentially escaping out of the work space.
- F. Remove barriers carefully to minimize the spread of contaminants.
- G. Except where not feasible and otherwise approved by Government, remove waste and debris via an exterior type chute and to containers with closed and tightly sealed tops.

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1. Where not feasible and otherwise approved, waste shall be removed in clean air-tight covered containers and transported from the work area by a pre-determined route during off-peak hours. Designated debris removal routes shall be cleaned by damp-mop and HEPA filtered vacuuming prior to being returned to Owner use.
- H. For work performed exterior to the building envelope, do not remove waste and debris through building interior spaces.

--- END ---

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, 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 affect 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 VA COTR 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 VA COTR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.
 - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - j. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas.
- 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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: Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the VA COTR. 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.
 - 3. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 - 4. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 - 5. Handle discarded materials other than those included in the solid waste category as directed by the VA COTR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
 - 1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas.
- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife.
- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with State regulations, Federal emission and performance laws and standards, and other local regulations, ordinances, laws, and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
 - 1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials at all times, including weekends, holidays, and hours when work is not in progress.

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2. Particulates Control: Maintain all permanent and temporary access roads, plant sites, 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.
- F. 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 VA COTR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the VA COTR. Repetitive impact noise on the property shall not exceed the following dB limitations:

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

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

- a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75		
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Use shields or other physical barriers to restrict noise transmission.

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- 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 VA COTR 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 VA COTR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

--- E N D ---

SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies temporary interior signs.

PART 2 - PRODUCTS

2.1 TEMPORARY SIGNS

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 LOCATION

- A. Install on doors that have room, corridor, and space numbers shown.
- B. Doors that do not require signs are as follows:

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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.

--- E N D ---

SECTION 01 62 35
RECYCLED/RECOVERED MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers the requirements of the EPA's Comprehensive Procurement Guide (CPG) Program.

1.2 RELATED SECTIONS

- 1. Section 01 00 00 GENERAL REQUIREMENTS.
- 2. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT for recycling of non-hazardous construction and demolition waste.
- 3. Section 01 81 11 SUSTAINABLE DESIGN REQUIREMENTS for sustainable design general requirements and procedures.
- 4. Division 02 through 49 sections for materials, products, and equipment.

1.3 REFERENCES

- 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. Section 6002 of the Resource Conservation and Recovery Act (RCRA).
- C. Executive Order 13148, "Greening the Government Through Leadership in Environmental Management".
- D. Code of Federal Regulations (CFR):

40 CFR 247Comprehensive Procurement Guidelines for Products Containing
Recovered Materials

1.4 PERFORMANCE REQUIREMENTS

- A. CPG Program: The CPG program is part of EPA's continuing effort to promote the use of materials recovered from solid waste. Buying recycled-content products ensures that the materials collected in recycling programs will be used again in the manufacture of new products. The CPG program is authorized by Congress under Section 6002 of the Resource Conservation and Recovery Act (RCRA) and Executive Order 13148. EPA is required to designate products that are or can be made with recovered materials, and to recommend practices for buying these products. Once a product is designated, procuring agencies are required to purchase it with the highest recovered material content level practicable.

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- B. Objectives: It is the VAMC procurement policy to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable, consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. A key component of the CPG program is EPA's list of designated products and the accompanying recycled-content recommendations. EPA has already designated or is proposing to designate the products listed below. They are grouped into eight categories:
1. Construction Products.
 2. Landscaping Products.
 3. Non-paper Office Products.
 4. Paper and Paper Products.
 5. Park and Recreation Products.
 6. Transportation Products.
 7. Vehicular Products.
 8. Miscellaneous Products.
- C. CPG Website: The CPG list is located at the following URL.
- <http://www.epa.gov/cpg/products.htm>
- D. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the contracted work.

1.5 EPA PROPOSED ITEMS IN THE WORK

- A. Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.6 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED INTO THE WORK

- A. There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

1.7 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Recordkeeping Documentation: Contractor shall provide submittals outlining the individual products and quantities that have been used on the project which meet the CPG guidance

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outlined in the preceding sections. These submittals shall be prepared on a quarterly basis throughout the term of the contract and submitted to the COTR for inclusion in the contract records and documentation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes procedural requirements for cutting and patching.

1.2 RELATED WORK:

- A. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Section 02 41 00 DEMOLITION for demolition of selected portions of the building.
- D. Asbestos Removal: Section 02 82 11, ASBESTOS ABATEMENT.
- E. Section 03 54 16 HYDRAULIC CEMENT UNDERLAYMENT for patching existing concrete slabs at cutouts and areas scheduled to receive finish flooring.
- F. Section 07 84 00 FIRESTOPPING for patching fire-rated construction.
- G. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include, but are not limited to, the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include, but are not limited to, the following:

1. Water, moisture, air, or vapor barriers.
2. Membranes and flashings.
3. Exterior façade construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place or Existing Materials: Use materials identical to in-place or existing materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize or prevent interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place or existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place or existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - b. Patching Existing Plaster: Patch existing plaster walls using compatible plaster materials and accessories. Feather new plaster surfaces where meeting existing plaster surfaces to provide an even surface of uniform finish, texture, and appearance.
 - c. Patching Existing Masonry Walls: Patch walls by toothing-in units using salvaged or new masonry units matching existing units for type and size. Match coursing patterns, mortar joint profiles, and other features of existing masonry walls. Use accessory materials compatible with existing materials. Where increasing existing sizes of openings, provide lintels as specified in SECTION 05 50 00 METAL FABRICATIONS.
 - d. Patching Existing Concrete Slabs at Removed Flooring: Patch slab areas to receive finish flooring systems with flooring underlayment as specified in SECTION 03 54 16 HYDRAULIC CEMENT UNDERLAYMENT.
 4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.
 6. Spray Applied Fireproofing: As installation of construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to the work. Patch and repair fireproofing damaged by the work before coating it or concealing it with other construction. Comply with fireproofing manufacturer's recommended patching instructions as required to maintain fire-resistive ratings and appearance.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

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--- E N D ---

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.
 - 15. Cement fiber products (including shingles, panels, siding).
 - 16. Rigid foam.
 - 17. Glass.
 - 18. Roofing.
 - 19. Doors and frames.
 - 20. Door hardware.
 - 21. Windows.
 - 22. Acoustical tile and panels.
 - 23. Demountable partitions.
 - 24. Equipment.
 - 25. Cabinets.

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26. Plumbing fixtures.
27. Piping.
28. Supports and hangers.
29. Valves.
30. Sprinklers.
31. Mechanical equipment.
32. Refrigerants.
33. Electrical conduit.
34. Copper wiring.
35. Lighting fixtures.
36. Lamps.
37. Ballasts.
38. Electrical devices.
39. Switchgear and panel boards.
40. Transformers.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- C. Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS.
- D. Section 02 41 00, DEMOLITION.
- E. Asbestos Removal: Section 02 82 11, ASBESTOS 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 and 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 salvage, reuse and recycle non-hazardous solid waste generated by the Work to a minimum of 50 percent.

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- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.
- I. Comply with 40 CFR 173.164(e) and other federal, state, and local regulations for disposal of fluorescent light tubes.
- J. Designated Manager Qualifications: Experienced, with a record of successful waste management coordination of Projects with similar requirements.
- K. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- L. Regulatory Requirements: Comply with federal, state, and local hauling and disposal regulations.

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.

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- 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:

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- B. Construction Waste Management Plan: Prepare and submit to the Resident Engineer a written construction and demolition waste 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.
 - f. Indicate fees for use of each facility including tipping fees, transportation costs, and other costs. Indicate projected cost for disposing of total project waste in each type of facility.
 - g. Indicate projected costs to reuse, salvage, or recycle materials.
 - h. Indicate means for protecting materials from contamination.
 - i. Indicate regular meetings to be held to address construction waste management. Include description of meeting topics.
- 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. Submit summary with each application for payment. Failure to submit summary shall render the application for payment incomplete.
 2. Summary shall be submitted on forms acceptable to Contracting Officer and at a minimum shall contain the information indicated in Articles 'Records' and 'Report'.
- E. Recycling Facility Qualification Data: For each recycling facility. Include the following:
1. Letter signed by responsible party at recycling facility and on facility letterhead.
 - a. State qualifications including number of years in recycling business.
 - b. State end use of recycled materials.
 - c. State recycling rate of the recycling facility.
- F. Qualification Data: For Designated Manager and refrigerant recovery technician.

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- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

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.

1. U.S. Green Building Council (USGBC):

LEEDLEED Green Building Rating System for New Construction

- B. National Institute of Building Sciences:

WBDGWhole Building Design Guide

1.7 RECORDS

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

- B. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use indicated forms or use Contractor's standard forms acceptable to Resident Engineer and containing indicated minimum content. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

- C. Waste Reduction Progress Reports: Concurrent with each Application for Payment, but not less than on a monthly basis, submit report. Use indicated forms or use Contractor's standard forms acceptable to Resident Engineer and containing indicated minimum content. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons (tonnes).
4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).

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5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
 6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
 8. Provide the average diversion rates for each material, for each month, for each facility.
- D. Waste Reduction Calculations: Before request for project completion inspections, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- E. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- F. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- G. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Indicate fees paid, transportation costs, and total recycling and processing costs. Include manifests, weight tickets, receipts, and invoices.
- H. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Indicate fees paid, transportation costs, and total disposal costs. Include manifests, weight tickets, receipts, and invoices.

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 PLAN IMPLEMENTATION

- A. General: Implement approved construction waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement construction waste management plan during the entire duration of the Contract.
- B. Designated Manager: Designate a waste management coordinator responsible for implementing, monitoring, and reporting status of waste management work plan. Designated Manager shall be present at Project site full time for duration of Project.

- C. Training: Train workers, subcontractors, suppliers, Owner's construction forces, and Owner's Separate Contractors on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute approved construction waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute approved construction waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold. Keep recycling and waste container areas neat and clean. Clearly mark containers, prevent contamination of materials.
 - 2. Comply with requirements for controlling dust and dirt, environmental protection, and noise control.

3.2 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.

3.3 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.

3.4 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.

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- 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 81 11
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 OBJECTIVES

- A. To obtain acceptable Indoor Air Quality (IAQ) for the completed project and minimize the environmental impacts of the construction and operation, the Contractor during the construction phase of this project shall implement the following procedures:
 - 1. Select products that minimize consumption of non-renewable resources, consume reduced amounts of energy and minimize amounts of pollution to produce, and employ recycled and/or recyclable materials. It is the intent of this project to conform with EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:
 - a. Include environmental considerations as part of the normal purchasing process.
 - b. Emphasize pollution prevention early in the purchasing process.
 - c. Examine multiple environmental attributes throughout a product's or service's life cycle.
 - d. Compare relevant environmental impacts when selecting products and services.
 - e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.
 - 2. Control sources for potential IAQ pollutants by controlled selection of materials and processes used in project construction in order to attain superior IAQ.
 - 3. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in proposing product substitutions and/or changes to specified processes.
 - 4. Use building practices that ensure construction debris and particulates do not contaminate or enter duct work prior to system startup and turn over.

1.3 RELATED DOCUMENTS

- A. Section 016235 RECYCLED/RECOVERED MATERIALS
- B. Section 017419 CONSTRUCTION WASTE MANAGEMENT

1.4 DEFINITIONS

- A. Agrifiber Products: Composite panel products derived from agricultural fiber
- B. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials
- C. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight
- D. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that it was obtained from forests certified by a specified certification program
- E. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder
- F. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 017419.
- G. Third Party Certification: Certification of levels of environmental achievement by nationally recognized sustainability rating system.
- H. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky
- I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock
- J. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use
- K. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 "Guidelines for the Use of Environmental Marketing Claims": www.ftc.gov/bcp/gnrule/guides980427.
- L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 500 miles (800 km) from the Project site
- M. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured
- N. Sealant: Any material that fills and seals gaps between other materials
- O. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing.

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- P. Type 2 Finishes: "Fuzzy" materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gas
- Q. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals:
 - 1. Salvaged or Reused Materials: Provide documentation that lists each salvaged or reused material, the source or vendor of the material, the purchase price, and the replacement cost if greater than the purchase price.
 - 2. Recycled Content: Submittals for materials with recycled content (excluding MEP systems equipment and components) shall include the following documentation:
 - a. Cost of each material or product, excluding cost of labor and equipment for installation.
 - b. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product.
 - c. An electronic spreadsheet that tabulates the Project's total materials cost and combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value) expressed as a percentage of total materials cost. Spreadsheet shall be submitted every month with the Contractor's Certificate and Application for Payment. It shall indicate, on an on-going basis, line items for each material, including cost, pre-consumer recycled content, post-consumer recycled content, and combined recycled content value.
 - 3. Regional Materials: Submittals for products or materials expected to contribute to the regional calculation (excluding MEP systems equipment and components) shall include the following documentation:
 - a. Cost of each material or product, excluding cost of labor and equipment for installation
 - b. Location of product manufacture and distance from point of manufacture to the Project Site
 - c. Location of point of extraction, harvest, or recovery for each raw material in each product and distance from the point of extraction, harvest, or recovery to the Project Site
 - d. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of manufacture for each regional material
 - e. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of extraction, harvest, or recovery for each regional material or product, including, at a minimum, gravel and fill, planting materials, concrete, masonry, and GWB.

- f. An electronic spreadsheet that tabulates the Project's total materials cost and regional materials value, expressed as a percentage of total materials cost. This spreadsheet shall be submitted every month with the Contractor's Certificate and Application for Payment. It shall indicate on an ongoing basis, line items for each material, including cost, location of manufacture, distance from manufacturing plant to the Project Site, location of raw material extraction, and distance from extraction point to the Project Site.
- 4. Bio-based Products:
 - a. Rapidly Renewable Products: Submittals shall include written documentation from the manufacturer declaring that rapidly renewable materials are made from plants harvested within a ten-year or shorter cycle and shall indicate the percentage (by weight) of these rapidly renewable components contained in the candidate products, along with the costs of each of these materials, excluding labor and delivery costs.
 - b. Certified Wood: Submittals for all wood-based materials shall include a statement indicating the cost of each product containing FSC Certified wood, exclusive of labor and delivery costs, and third party verification of certification from one of the following:
 - 1) Documentation from the supplier verifying that 100 percent of the wood-based content originates from SFI third-party certified forest lands, identifying the company or companies that performed the SFI third-party certification for both the forest land management and the certified product content.
- 5. Interior Adhesives and Sealants: Submittals for field-applied adhesives and sealants, which have a potential impact on indoor air, shall include manufacturer's certification, information, or product data highlighting VOC content.
 - a. Provide manufacturers' documentation verifying adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde.
- 6. Interior Paints and Coatings: Submittals for field-applied paints and coatings, which have a potential impact on indoor air, shall include manufacturer's certification, information, or product data highlighting VOC content
- 7. Composite Wood and Agrifiber Binders: Submittals for all composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.
- 8. Air Filtration: Provide manufacturer's cut sheets and product data highlighting the following:
 - a. Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs) per ASHRAE HVAC Design Manual for Hospitals and Clinics.
 - b. Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction per ASHRAE HVAC Design Manual for Hospitals and Clinics.
- 9. Mercury in Lighting: Provide manufacturer's cut sheets or product data for fluorescent or HID lamps highlighting mercury content.
- 10. Lighting Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting lighting controls systems components.
- 11. Gypsum Wall Board: Provide manufacturer's cut sheets or product data verifying that gypsum wallboard products are moisture and mold-resistant.

12. Fiberglass Insulation: Provide manufacturer's cut sheets or product data verifying that fiberglass batt insulation contains no urea-formaldehyde.
 13. Duct Acoustical Insulation: Provide manufacturer's cut sheets or product data verifying that mechanical sound insulation materials in air distribution ducts consists of an impervious, non-porous coatings that prevent dust from accumulating in the insulating materials.
 14. Green Housekeeping: Provide documentation that cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.
- C. Project Materials Cost Data: Provide a spreadsheet in an electronic file indicating the total cost for the Project and the total cost of building materials used for the Project, as follows:
1. Not more than 60 days after the Preconstruction Meeting, the Contractor shall provide to the Resident Engineer a preliminary schedule of materials costs for all materials used for the Project organized by specification section. Exclude labor costs and all mechanical, electrical, and plumbing (MEP) systems materials and labor costs. Include the following:
 - a. Identify each reused or salvaged material, its cost, and its replacement value.
 - b. Identify each recycled-content material, its post-consumer and pre-consumer recycled content as a percentage the product's weight, its cost, its combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value), and the total combined recycled content value for all materials as a percentage of total materials costs.
 - c. Identify each regional material, its cost, its manufacturing location, the distance of this location from the Project site, the source location for each raw material component of the material, the distance of these extraction locations from the Project site, and the total value of regional materials as a percentage of total materials costs.
 - d. Identify each bio-based material, its source, its cost, and the total value of bio-based materials as a percentage of total materials costs. Also provide the total value of rapidly renewable materials (materials made from plants that are harvested in less than a 10-year cycle) as a percentage of total materials costs.
 - e. Identify each wood-based material, its cost, the total wood-based materials cost, each FSC Certified wood material, its cost, and the total value of Certified wood as a percentage of total wood-based materials costs.
 2. Provide final versions of the above spreadsheets to the Resident Engineer not more than 14 days after Substantial Completion.
- D. Construction Waste Management: See Section 017419 "Construction Waste Management" for submittal requirements.
- E. Construction Indoor Air Quality (IAQ) Management: Submittals shall include the following:
1. Not more than 30 days after the Preconstruction Meeting, prepare and submit for the Resident Engineer's approval, an electronic copy of the draft Construction IAQ Management Plan in an electronic file including, but not limited to, descriptions of the following:
 2. Instruction procedures for meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling
 - a. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage

- b. Schedule of submission to Resident Engineer of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials
 - c. Instruction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille
 - d. Instruction procedure for replacing all air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit
 - 3. Not more than 30 days following receipt of the approved draft CIAQMP, submit an electronic copy of the approved CIAQMP in an electronic file, along with the following:
 - a. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for all filtration media to be installed at return air grilles during construction if permanently installed AHUs are used during construction.
 - b. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs).
 - 4. Not more than 14 days after Substantial Completion provide the following:
 - a. Documentation verifying required replacement of air filtration media in all air handling units (AHUs) after the completion of construction and prior to occupancy and, if applicable, required installation of filtration during construction.
 - b. Minimum of 18 Construction photographs: Six photographs taken on three different occasions during construction of the SMACNA approaches employed, along with a brief description of each approach, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 - c. A copy of the report from testing and inspecting agency documenting the results of IAQ testing, demonstrating conformance with IAQ testing procedures and requirements.
- F. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports for the following:
- 1. Construction Waste Management: Waste reduction progress reports and logs complying with the requirements of Section 017419 "Construction Waste Management."
 - 2. Construction IAQ Management: See details in PART 3 for Construction IAQ management progress report requirements.

1.6 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

- A. Pest Control: Pest control measures shall utilize EPA-registered bio-pesticides only.
- B. Salvaged or Reused materials: There shall be no substitutions for specified salvaged and reused materials and products.
 - 1. Salvaged materials: Use of salvaged materials reduces impacts of disposal and manufacturing of replacements.
- C. Recycled Content of Materials:
 - 1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 10 percent of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.
 - a. Post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 - b. Do not include mechanical and electrical components in the calculations.
 - c. Do not include labor and delivery costs in the calculations.
 - d. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).
 - e. The materials in the following list shall contain the indicated minimum recycled content:

Category	Minimum Recycled Content
Compost/mulch	100% post-consumer
Asphaltic Concrete Paving	25% post-consumer
Cast-in-Place Concrete	6% pre-consumer
CMU: Gray Block	20% pre-consumer
Steel Reinforcing Bars	90% combined
Structural Steel Shapes	90% combined
Steel Joists	75% combined
Steel Deck	75% combined
Steel Fabrications	60% combined

Steel Studs	30% combined
Steel Roofing	30% post-consumer
Aluminum Fabrications	35% combined
Rigid Insulation	20% pre-consumer
Batt insulation	30% combined

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 017419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period, install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
2. Replace all air filters immediately prior to occupancy.

- B. Comply with one of the following requirements:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
3. Air-Quality Testing:
 - a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "LEED Reference Guide for Green Interior Design and Construction."
 - b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

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- 1) Formaldehyde: 27 ppb.
 - 2) Particulates (PM10): 50 micrograms/cu. m.
 - 3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - 4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - 5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
- c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from same locations as in the first test.
- d. Air-sample testing shall be conducted as follows:
- 1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - 2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - 3) Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
 - 4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

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SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section 019100 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 22, Division 23 and Division 26 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.
- C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.
- D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 08, Division 22, Division 23, and Division 26 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.
- E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction, and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:
 - 1. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
 - 2. Verify and document proper integrated performance of equipment and systems.
 - 3. Verify that Operations & Maintenance documentation is complete.
 - 4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
 - 5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
 - 6. Document the successful achievement of the commissioning objectives listed above.
- F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

- G. The Commissioning Agent, both the firm and individual designated as the Commissioning Agent, shall be certified by at least one of the following entities: the National Environmental Balancing Bureau (NEBB), the Associated Air Balance Council Commissioning Group (AABC), and the Building Commissioning Association (BCA). Certification(s) shall be valid and active. Proof of certification(s) shall be submitted to the Contracting Officer and the Resident Engineer three (3) calendar days after the Notice to Proceed.

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 Resident Engineer as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer and the Resident Engineer.
- B. In this structure, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Resident Engineer 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 Resident Engineer 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 Resident Engineer.
- 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 Resident Engineer. 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 Resident Engineer 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 Resident Engineer to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or Resident Engineer will issue an official directive to this effect.
 - 4. All parties to the Commissioning Process shall be individually responsible for alerting the Resident Engineer 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 Resident Engineer, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

- A. Section 010000 GENERAL REQUIREMENTS.
- B. Section 260800 COMMISSIONING OF ELECTRICAL SYSTEMS.

1.4 SUMMARY

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

1.5 DEFINITIONS

- A. Architect-Engineer: Includes Architect-Engineer identified in the Contract for Construction between the Department of Veterans Affairs and Contractor, plus consultant/design professionals responsible for design of fire suppression, plumbing, HVAC, controls for HVAC systems, electrical, communications, electronic safety and security, as well as other related systems.
- B. CxA: Commissioning Agent.
- C. Commissioning Plan: a document that is an overall plan that outlines the commissioning process, commissioning team responsibilities, schedule for commissioning activities, and commissioning documents.
- D. Commissioning Issue: a condition in the installation or function of a component, piece of equipment or system that affects the system operations, maintenance, and/or repair.
- E. Commissioning Observation: a condition in the installation or function of a component, piece of equipment or system that may not be in compliance with the Contract Documents, or may not be in compliance with the manufacturer's installation instructions, or may not be in compliance with generally accepted industry standards.
- F. Systems Functional Performance Test: a test, or tests, of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Systems Functional Performance Testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not Systems Functional Performance Testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while System Functional Performance Testing is verifying that the system has already been set up properly and is functioning in accordance with the Construction Documents. The Commissioning Agent develops the Systems Functional Performance Test Procedures in a sequential written form, coordinates, witnesses, and documents the actual testing. Systems Functional Performance Testing is performed by the Contractor. Systems Functional Performance Tests are performed

after startups, control systems are complete and operational, TAB functions and Pre-Functional Checklists are complete.

- G. System: A system is defined as the entire set of components, equipment, and subsystems which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one component of an entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam supply, chilled water supply, refrigerant supply, hot water supply, controls and electrical service, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of the fuel supply, combustion air, controls, steam, feedwater supply, condensate return and other related components.
- H. Pre-Functional Checklist: a list of items provided by the Commissioning Agent to the Contractor that require inspection and elementary component tests conducted to verify proper installation of equipment. Pre-Functional Checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some Pre-Functional Checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The term "Pre-Functional" refers to before Systems Functional Performance Testing. Pre-Functional Checklists augment and are combined with the manufacturer's startup checklist and the Contractor's Quality Control checklists.
- I. Seasonal Functional Performance Testing: a test or tests that are deferred until the system will experience conditions closer to their design conditions.
- J. VA: Includes the Contracting Officer, Resident Engineer, or other authorized representative of the Department of Veterans Affairs.
- K. TAB: Testing, Adjusting, and Balancing.

1.6 SYSTEMS TO BE COMMISSIONED

- A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.
- B. The following systems will be commissioned as part of this project:
 - 1. Electrical (Division 26)
 - a. Normal Power Distribution Systems (Grounding tests, coordination study review, major circuit breaker settings, meters and gages, and controls).
 - b. Life Safety Power Distribution Systems (Automatic transfer on loss of normal power, grounding tests, coordination study review, major circuit breaker settings, meters and gages, and controls).
 - c. Lighting Controls (Control system hardware and software, scene settings, zone settings, occupancy sensor interface, and unoccupied cycle control).

1.7 COMMISSIONING TEAM

A. Members Appointed by Contractor:

1. Contractor: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
2. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by VA:

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

1.8 VA'S COMMISSIONING RESPONSIBILITIES

A. Appoint an individual, company or firm to act as the Commissioning Agent.

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

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

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

1.9 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall assign a Commissioning 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.

1.10 COMMISSIONING AGENT'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan. See Paragraph 1.11 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 Section 010000 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.

1.11 COMMISSIONING DOCUMENTATION

- A. Commissioning Agent's Certification(s): Commissioning Agent shall submit evidence of valid and current certification(s), as required in Section 1.1(G), to the Contracting Officer.
- B. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
 - 2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
 - 3. Identification of systems and equipment to be commissioned.
 - 4. Schedule of Commissioning Coordination meetings.
 - 5. Identification of items that must be completed before the next operation can proceed.
 - 6. Description of responsibilities of commissioning team members.
 - 7. Description of observations to be made.
 - 8. Description of requirements for operation and maintenance training.

9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
 10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
 11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
 12. Preliminary Systems Functional Performance Test procedures.
- C. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification code of tested system.
 2. Test number.
 3. Time and date of test.
 4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
 5. Dated signatures of the person performing test and of the witness, if applicable.
 6. Individuals present for test.
 7. Observations and Issues.
 8. Issue number, if any, generated as the result of test.
- D. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.
- E. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.
- F. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.
1. Contractor is responsible for correcting work where test results and inspections indicate that work does not comply with the contract documents.
 2. Contractor is responsible for costs of additional testing and inspecting and other related costs incurred by VA for replaced or additional work required in order for work to comply with contract documents.

- G. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.
1. Creating an Commissioning Issues Log Entry:
 - a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
 - b. Assign a descriptive title for the issue.
 - c. Identify date and time of the issue.
 - d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
 - e. Identify system, subsystem, and equipment to which the issue applies.
 - f. Identify location of system, subsystem, and equipment.
 - g. Include information that may be helpful in diagnosing or evaluating the issue.
 - h. Note recommended corrective action.
 - i. Identify commissioning team member responsible for corrective action.
 - j. Identify expected date of correction.
 - k. Identify person that identified the issue.
 2. Documenting Issue Resolution:
 - a. Log date correction is completed or the issue is resolved.
 - b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
 - c. Identify changes to the Contract Documents that may require action.
 - d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
 - e. Identify person(s) who corrected or resolved the issue.
 - f. Identify person(s) verifying the issue resolution.
- H. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:
1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
 2. Commissioning plan.
 3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
 4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
 5. Commissioning Issues Log.
 6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

- I. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:
 - 1. Documentation of deferred and off season test(s) results.
 - 2. Completed Systems Functional Performance Test Procedures for off season test(s).
 - 3. Documentation that unresolved system performance issues have been resolved.
 - 4. Updated Commissioning Issues Log, including status of unresolved issues.
 - 5. Identification of potential Warranty Claims to be corrected by the Contractor.
- J. Systems Manual: The Commissioning Agent will gather required information and compile the Systems Manual. The Systems Manual will include, but is not limited to, the following:
 - 1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
 - 2. Reference to Final Commissioning Plan.
 - 3. Reference to Final Commissioning Report.
 - 4. Approved Operation and Maintenance Data as submitted by the Contractor.

1.12 SUBMITTALS

- A. Preliminary Commissioning Plan Submittal: The Commissioning Agent will prepare a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan will be provided for information only. It will contain preliminary information about the following commissioning activities:
 - 1. The Commissioning Team: A list of commissioning team members by organization.
 - 2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).
 - 3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
 - 4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
 - 5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
 - 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 Resident Engineer with copies to the Contractor and Architect-Engineer.
- 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.

1.13 COMMISSIONING PROCESS

- A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.
- B. Within 14 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CM) 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 14 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing

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

1.14 QUALITY ASSURANCE

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

1.15 COORDINATION

- A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor will work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction Schedule as directed by the VA.
- C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.
- D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.
- F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

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

PART 3 - EXECUTION

3.1 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

- A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.
 - 1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
 - a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
 - b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.
 - 2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
 - a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.

- b. The full startup plan shall at a minimum consist of the following items:
 - 1) The Pre-Functional Checklists.
 - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - 3) The manufacturer's normally used field checkout sheets.
 - a) The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
 - b) The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.
- 3. Sensor and Actuator Calibration
 - a. All field installed 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 22, Division 23, and Division 26 specifications.
 - b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
- 4. Execution of Equipment Startup
 - a. Four weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
 - b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
 - c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
 - d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

3.2 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

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

3.3 PHASED COMMISSIONING

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

3.4 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 non-compliant work is with the Contractor.

3.5 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.

3.6 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.

3.7 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 Resident Engineer, 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 specification 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).

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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 Videotapes: Submit two copies within seven days of end of each training module.
 - a. Identification: On each copy, provide an applied label with the following information:
 - 1) Name of Project.
 - 2) Name and address of photographer
 - 3) Name of Contractor.
 - 4) Date videotape was recorded.
 - 5) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
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. **COORDINATION**

1. Coordinate instruction schedule with VA's operations. Adjust schedule as required to minimize disrupting VA's operations.
2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the VA.

F. INSTRUCTION PROGRAM

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - a. Fire protection systems, including fire alarm and fire suppression systems.
 - b. Intrusion detection systems.
 - c. HVAC systems, including air distribution systems, terminal equipment, and devices.
 - d. Switchgear, transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
 - e. Lighting equipment and controls.
 - f. 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.

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- 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:

- A. This section specifies selective demolition and removal of portions of buildings, utilities, and debris.

1.2 RELATED WORK:

- A. Safety Requirements: FAR Part 52 and VAAR Part 852.
- 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. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS and Section 01 56 10, DUST AND AIRBORNE CONTAMINANTS CONTROL.
- E. Cutting and Patching Procedures: Section 01 73 29, CUTTING AND PATCHING.
- F. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- G. Asbestos Removal: Section 02 82 11, ASBESTOS ABATEMENT.
- H. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

1.3 DEFINITIONS

- A. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- B. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- C. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- D. Remove and Salvage: Carefully detach items from existing construction, in a manner to prevent damage, and recover for subsequent sale or reuse in another facility. If approved by the Contracting Officer or where indicated to remain property of Government, items may be delivered to Owner ready for reuse.

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- E. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- F. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 PROTECTION:

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of FAR Part 52 and VAAR Part 852.
- 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, 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.
- D. 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.
- E. 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.
 - 4. 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 Resident Engineer. 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 Resident Engineer's approval.
 - 5. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

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

1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of buildings immediately adjacent to selective demolition area. Conduct selective demolition so Medical Center operations will not be disrupted.
 1. Comply with requirements specified in Section 01 00 00, GENERAL REQUIREMENTS.
- B. Government assumes no responsibility for condition of areas to be selectively demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Medical Center as far as practical.
 1. Before selective demolition, Medical Center will remove the following items:
 - a. Furniture, equipment, and other items that are not part of built-in construction.
- C. Notify Resident Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire-protection facilities in service during selective demolition operations.
- F. Maintain access to existing walkways, egress routes, corridors, and adjacent occupied or used facilities.
 1. Do not close or obstruct walkways, egress routes, corridors, or occupied or used facilities without written permission from Contracting Officer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Contracting Officer. Government does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
 - 1. Prior to drilling or coring into or through concrete floors, beams, columns, or other structural elements, conduct non-destructive surveys to identify the presence of embedded items that could be damaged by the proposed drilling or coring. Use survey results to determine locations for drilling or coring that will not damage embedded items.
- D. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Resident Engineer.

3.2 PREPARATION

- A. Participate in training provided by Waste Management Coordinator and review waste management plan.
- B. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 4. Comply with requirements for temporary enclosures, dust control, noise control, heating, and cooling.

3.3 SELECTIVE DEMOLITION:

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 4. Maintain adequate ventilation when using cutting torches.
 - 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 7. Dispose of, recycle, or salvage demolished items and materials promptly. Comply with requirements in Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
 - 8. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Reuse, Recycling, and Salvage of Building Elements: Project has been designed to result in minimum end-of-Project rates for salvage or recycling of total non-hazardous solid waste generated by the Work. Do not demolish building elements beyond what is indicated on Drawings without Resident Engineer's approval. Use all reasonable means to divert demolition waste from landfills and incinerators.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner, or until sale or re-use.
 - 4. Transport items to Medical Center's storage area designated by Resident Engineer.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
 - 5. Restore finishes of reinstalled items to match finish existing prior to removal.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Resident Engineer, items may be removed to a

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suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

- F. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by Contractor daily, off the Medical Center property to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and regulations.
- G. Remove and legally dispose of all materials, from any trash dumps. Materials removed shall become property of Contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and regulations. All materials in the trash dump areas, shall be included as part of the lump sum compensation for the work of this section. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- H. Do not burn demolished materials.
- I. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Resident Engineer. When Utility lines are encountered that are not indicated on the drawings, the Resident Engineer shall be notified prior to further work in that area.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- B. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

3.5 CLEAN-UP:

- A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Resident Engineer. Clean-up shall include off the Medical Center 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
ASBESTOS ABATEMENT SPECIFICATIONS

PART 1 - GENERAL

1.1 SUMMARY OF THE WORK

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

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

1.1.2 EXTENT OF WORK

- A. It is anticipated that the asbestos abatement project will be performed in several phases according to the phasing schedule. It is the asbestos contractor's responsibility to comply with the phasing schedule. Changing, decreasing and increasing of phases, size, location and scope of work shall not constitute compensation by the Owner or any of his representatives.

Basement:

"C Wing" Main Corridor	Slight Yellow 12"x 12" Vinyl Floor Tile and Mastic	700 SF
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Third Floor

"C Wing" Main Corridor	Wall plaster and Fabric Covering	5,000 SF
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Fifth Floor:

"A Wing" Main Corridor	9"x 9" Vinyl Floor Tile and Mastic	2,000 SF
"C Wing" Main Corridor	9"x 9" Vinyl Floor Tile and Mastic	1,200 SF
Elevator Lobby	9"x 9" Vinyl Floor Tile and Mastic	1,300 SF

Sixth Floor:

"C Wing" Main Corridor	9"x 9" Vinyl Floor Tile and Mastic	400 SF
Elevator Lobby	9"x 9" Vinyl Floor Tile and Mastic	750 SF
Room 653	Multiple Layers of Flooring and Mastic	650 SF

Specific Notes:

The Contractor must at a minimum comply with the following specific notes.

1. It's the Asbestos Contractor's (Contractor) responsibility to inspect the site and confirm condition and quantities prior to the submission of his/her bid package. It is also the Contractor's responsibility to review the demolition drawings, notes and phasing configurations. The contractor must include in his/her bid the entire scope of work listed above.
2. Remove and dispose as ACM of all types of flooring materials listed above, including but not limited to vinyl floor tiles (multiple layers at various locations), resilient baseboard, stair treads,

transition strips, leveling compound and mastic under all above items (Flooring Materials). Removal must be done which leave substrate smooth (in similar condition to that which existed prior to Mastic application). Use of Chemicals will not be permitted. Quantities listed above are for one layer. The Contractor must include the removal and disposal of all layers at no additional cost to the owner.

3. Remove and dispose of the wall plaster and wall covering.

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

- A. Pre-abatement activities including, 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.

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.

1.2 VARIATIONS IN QUANTITY

- A. The quantities and locations of ACM and the extent of work included in this section are estimated which are limited by the physical constraints imposed by occupancy of the building. Where additional work is required beyond the above variation, or where less quantities were found, the Contractor must provide unit prices (refer to 3.9.4) to be used as an addition and deduction to the contract. Unit prices shall be inclusive of all related costs. The Contractor must include in his/her bid the entire scope listed in 1.1.2.

1.3 STOP ASBESTOS REMOVAL

- A. If the Contracting Officer; their field representative; or the VPIH/CIH presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered air flow and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:
1. Serious injury/death at the site;
 2. Fire/safety emergency at the site;
 3. Respiratory protection system failure;
 4. Power failure or loss of wetting agent; or
 5. Any visible emissions observed outside the regulated area.

1.4 DEFINITIONS

1.4.1 GENERAL

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

1.4.2 GLOSSARY

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

ACM - Asbestos containing material

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.

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

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

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

Asbestos - Includes chrysotile, Amosite, Crocidolite, tremolite asbestos, Anthophyllite asbestos, Actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

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

Asbestos contaminated elements (ACE) - Building elements such

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

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

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

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

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

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

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

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

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

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

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 Contractor's industrial hygienist

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

Contractor's Professional Industrial Hygienist (CPIH) - The asbestos abatement contractor's retained industrial hygienist. The industrial hygienist must meet the qualification requirements of the VPIH. The VA and VPIH must approve the CPIH prior to commencement of work.

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

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

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

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

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

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

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

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

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

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

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.

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

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

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

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

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

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

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

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

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

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

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

Regulated ACM (RACM) - Friable ACM; Category I 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.

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

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

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

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

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

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

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

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

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

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

1.4.3 REFERENCED STANDARDS ORGANIZATIONS

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888
- C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300
- D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400
- E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420
- F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420
- H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420
- J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452
- K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association
2101 L Street, N.W.
Washington, DC 20037

VAMC Providence FCA Renovate Lobbies and Corridors
VA Project No. 650-08-104
PAI Project No. 35918.00

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

1.5 APPLICABLE CODES AND REGULATIONS

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these 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

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

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 1910.132 - 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

All State requirements that apply to the asbestos abatement work, disposal, clearance, etc., must be included.

1.5.5 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

1.5.6 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

1.5.7 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.

1.5.8 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.

1.5.9 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.

1.5.10 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately notify the VA.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by the Contractor.

1.5.11 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. Blood-borne 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.

1.5.12 PRE-CONSTRUCTION MEETING

- A. Prior to commencing the work, the Contractor shall meet with the VPIH 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:
 - 1. Proof of Contractor licensing.
 - 2. 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.
 - 3. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
 - 4. 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.
 - 5. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
 - 6. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
 - 7. A copy of the Contractor's Standard Operating Procedures for Asbestos Abatement. In these procedures, the following information must be detailed, specific for this project.
 - a. Regulated area preparation procedures;
 - b. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
 - c. Decontamination area set-up/layout and decontamination procedures for employees;
 - d. Abatement methods/procedures and equipment to be used;
 - e. Personal protective equipment to be used;
 - 8. At this meeting the Contractor shall provide all submittals as required.
 - 9. Procedures for handling, packaging and disposal of asbestos waste.
 - 10. 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 asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
 - 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
 - 3. The Contractor Professional Industrial Hygienist (CPIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
 - 4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

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

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.7.9 SUPPLIED AIR SYSTEMS

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

1.8 WORKER PROTECTION

1.8.1 TRAINING OF ABATEMENT PERSONNEL

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

conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

1.8.2 MEDICAL EXAMINATIONS

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

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

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

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 DECONTAMINATION PROCEDURE - PAPR

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

- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - 1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
 - 2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
 - 3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!).**
- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

1.8.6 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

- A. Provide each regulated area with separate personnel (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

1.9.2 GENERAL REQUIREMENTS

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

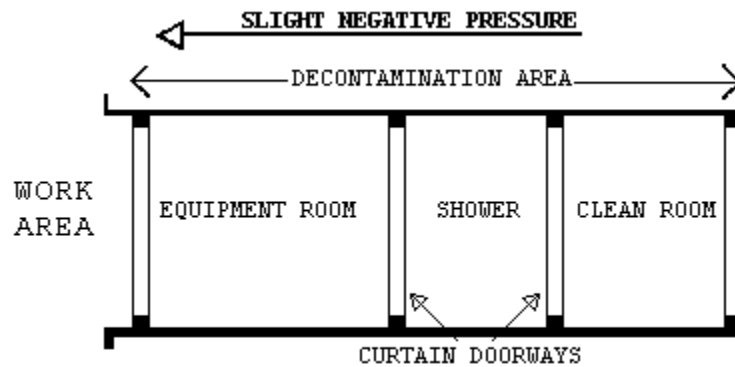
1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

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

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

- A. The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.
 - 1. Clean Room: The room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The 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 room. Provide 1 storage locker per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard

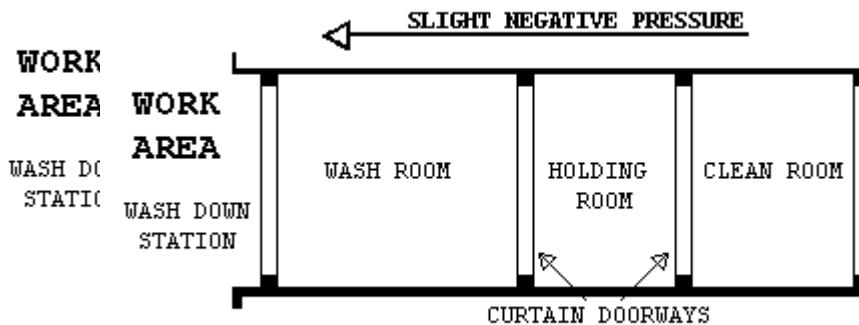
10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant polyethylenes. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.
4. The PDF shall look like as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF is 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 polyethylene sheeting. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.
5. The W/EDF shall be provided as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 WASTE/EQ

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

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

2.1 MATERIALS AND EQUIPMENT

2.1.1 GENERAL REQUIREMENTS

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

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. 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 polyethylene sheeting.
- 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, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- L. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.
- M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a hazard assessment conducted under 29 CFR 1910.132(d).

2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

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

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

2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.

- B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.
- C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97% when challenged with 0.3 μ m dioctylphthalate (DOP) particles. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10 μ m or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5 μ m or larger. Pre-filters shall be installed either on or in the intake opening of the 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 Underwriter's Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

2.1.5 PRESSURE DIFFERENTIAL

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

2.1.6 MONITORING

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

2.1.7 AUXILIARY GENERATOR

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

2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS

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

2.1.9 TESTING THE SYSTEM

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

2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM

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

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

2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS

- A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been completed.
The negative air machines shall not be shut down for the duration of the project unless authorized by the VA, in writing.
- B. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
- C. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been completed for that regulated area.

2.1.12 DISMANTLING THE SYSTEM

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

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

- A. Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide fire-stopping 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. All uncontaminated removable furniture, equipment and/or supplies shall be removed by the VA from the regulated area before commencing work. Any objects remaining in the regulated area shall be completely covered with 2 layers of 6-mil fire retardant poly sheeting and secured with duct tape. Lock out and tag out any HVAC/electrical systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.2.4 CRITICAL BARRIERS

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

2.2.5 PRIMARY BARRIERS

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

2.2.6 SECONDARY BARRIERS

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

2.2.7 EXTENSION OF THE REGULATED AREA

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

2.2.8 FIRESTOPPING

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be fire-stopped with a fire-rated fire-stop system providing an air tight seal.
- B. Fire-stop 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. Fire-stops 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. The CPIH is responsible for managing and performing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH is also, 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 the CPIH, who shall be trained and shall have specialized field experience in air sampling and analysis. The CPIH shall have a NIOSH 582 Course or equivalent and show proof. The CPIH shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing (PAT) program of AIHA for fiber counting quality control assurance. The CPIH shall have participated in at least five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytical laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29CFR 1926.1101(f)(g) and Appendix A. This log shall be made available to the VA representative and the VPIH. The log shall contain, at a minimum, information on personnel or area sampled, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.
- B. The VA might retain the services of an independent industrial hygienist (VPIH) to perform various services on behalf of the VA. The VPIH may 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 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 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 CPIH and or the VPIH 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. An agreement between the CPIH and the VPIH 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 both and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH AND CPIH

- A. The purpose of the work of the VPIH 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. The CPIH shall 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 visits to spot check overall compliance of work with contract/specifications. These visits shall include 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 VPIH such as evaluation of submittals from the Contractor, resolution of conflicts, interpret data, etc.
 5. Task 5: Perform, in the presence of the VPIH, 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 CPIH shall be available to the VPIH within 24-hours. The Contractor shall cooperate with and support the VPIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the CPIH and or the VPIH 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.

2.4 STANDARD OPERATING PROCEDURES

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

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1. Minimum Personnel Qualifications
2. Emergency Action Plan/Contingency Plans and Arrangements
3. Security and Safety Procedures
4. Respiratory Protection/Personal Protective Equipment Program and Training
5. Medical Surveillance Program and Recordkeeping
6. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area
7. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
8. Negative Pressure Systems Requirements
9. Monitoring, Inspections, and Testing
10. Removal Procedures for ACM
11. Removal of Contaminated Soil (if applicable)
12. Encapsulation Procedures for ACM
13. Disposal of ACM waste/equipment
14. Regulated Area Decontamination/Clean-up
15. Regulated Area Visual and Air Clearance
16. Project Completion/Closeout

2.5 SUBMITTALS

2.5.1 PRE-START MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 1. Supplied air system, if used, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
 2. Waste water filtration system, shower system, containment barriers.
 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, 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. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.

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1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
 1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.
 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
 3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. Rented equipment must be decontaminated prior to returning to the rental agency.
- L. Submit, before the start of work, the manufacturer's technical data for all types of Encapsulants and the MSDS. Provide application instructions also.

2.5.2 SUBMITTALS DURING ABATEMENT

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

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

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

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

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

2.6.2 PERFORMANCE REQUIREMENTS

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

- A. General Requirements for all Encapsulants:
 - 1. ASTM E84: Flame spread of 25; smoke emission of 50.
 - 2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
 - 3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
 - 4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
 - 1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft²).
 - 2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
 - 3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
 - 4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.
- C. Lockdown Encapsulants:
 - 1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
 - 2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft²) (test compatibility with cementitious and fibrous fireproofing).
 - 3. In certain situations, Encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

2.6.3 CERTIFICATES OF COMPLIANCE

The Contractor shall submit to the VA representative certification from the manufacturer indicating compliance with performance requirements for Encapsulants when applied according to manufacturer recommendations.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

- A. The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting

is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

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

- A. Conduct an inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.

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

3.2 REGULATED AREA PREPARATIONS

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
- B. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.
- C. 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.

3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA GENERAL:

Follow requirements of Section 2.2 – Containment Barriers and Coverings.

3.4 REMOVAL OF ACM

3.4.1 WETTING ACM

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and

OSHA's "wet methods" for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.

- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
- C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during removal.

3.4.2 SECONDARY BARRIER AND WALKWAYS

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

3.4.3 WET REMOVAL OF ACM

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

lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers may be needed for removal.

5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM. Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

3.4.4 WET REMOVAL OF AMOSITE

- A. 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.
- B. Provide local exhaust ventilation and collection systems to assure collection of Amosite fibers at the point of generation. A 300 mm (12") flexible rigid non-collapsing duct shall be located no more than 600 mm (2') from any scraping/brushing activity. Primary filters must be replaced every 30 minutes on the negative air machines. Each scraping/brushing activity must have a negative air machine devoted to it. For pre-molded pipe insulation or cutting wire lathe attach a 1200 mm (4') square flared end piece on the intake of the duct. Support the duct horizontally at a point 600 mm (2') below the work to effect capture. One person in the crew shall be assigned to operate the duct collection system on a continual basis.
- C. Amosite does not wet well with amended water. Submit full information/documentation on the wetting agent proposed prior to start for review and approval by the VA Representative. Insure that the material is worked on in small sections and is thoroughly and continuously wetted. Package as soon as possible while wet. Remove as required.

3.4.5 REMOVAL OF ACM/DIRT FLOORS AND OTHER SPECIAL PROCEDURES

- A. MAJOR ABATEMENT ON DIRT FLOORS:
When working on dirt floors, pick up all chunks of visible asbestos debris using wet methods if possible after set-up of PDF, W/EDF, negative air systems as required. Perform work and decontaminate/clean-up; perform lockdown as needed and complete work as required in these specifications. The asbestos contaminated soil (ACS) shall be removed and/or enclosed.
 1. Remove ACS as shown on drawings to a minimum depth of 2". After wetting to minimize dust, shovel dirt into disposal bags. The CPIH shall closely monitor work conditions and take appropriate action to protect workers from exposure to asbestos and heat stress. The minimum number of air changes per hour shall be six using negative air machines. Use special vacuum truck equipped with HEPA filtration to remove soil
 2. Enclosure of ACS using a concrete layer of 4" over the entire surface may also be done. Thoroughly dampen soil first before pouring concrete. Personnel shall be proficient in concrete finishing as well as asbestos trained.

3.5 LOCKDOWN ENCAPSULATION

3.5.1 GENERAL

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

3.5.2 DELIVERY AND STORAGE

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

3.5.3 WORKER PROTECTION

- A. Before beginning work with any material for which an MSDS has been submitted, provide workers with any required personal protective equipment. The required personal protective equipment shall be used whenever exposure to the material might occur. In addition to OSHA/specification requirements for respiratory protection, a paint pre-filter and an organic vapor cartridge, at a minimum, shall be used in addition to the HEPA filter when a solvent based encapsulant is used. The CPIH shall be responsible for provision of adequate respiratory protection.

3.5.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING

- A. Apply two coats of encapsulant to the scratch coat plaster or piping after all ACM has been removed. Apply in strict accordance with the manufacturer's instructions. Any deviation from the instructions must be approved by the VA's representative in writing prior to commencing the work.
- B. Apply the encapsulant with an airless sprayer at a pressure and using a nozzle orifice as recommended by the manufacturer. Apply the first coat while the scratch coat is still damp from the asbestos removal process, after passing the visual inspection. If the surface has been allowed to dry, wet wipe or HEPA vacuum prior to spraying with encapsulant. Apply a second coat over the first coat in strict conformance with the manufacturer's instructions. Color the encapsulant and contrast the color in the second coat so that visual confirmation of completeness and uniform coverage of each coat is possible. Adhere to the manufacturer's instructions for coloring. At the completion of the encapsulation, the surface must be a uniform third color produced by the mixture.

3.5.5 SEALING EXPOSED EDGES

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

3.6 DISPOSAL OF ACM WASTE MATERIALS

3.6.1 GENERAL

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

3.6.2 PROCEDURES

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall 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.

- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.
- C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

3.7 PROJECT DECONTAMINATION

3.7.1 GENERAL

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

3.7.2 REGULATED AREA CLEARANCE

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

3.7.3 WORK DESCRIPTION

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

3.7.4 PRE-DECONTAMINATION CONDITIONS

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

3.7.5 FIRST CLEANING

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

3.7.6 PRE-CLEARANCE INSPECTION AND TESTING

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

3.7.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

- A. With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification. Negative pressure shall be maintained in the regulated area during the lockdown application.

3.8 FINAL VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.8.1 GENERAL

- A. Notify the VPIH 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing shall be performed by the CPIH starting after the final cleaning. The VPIH may perform additional clearance monitoring.

3.8.2 FINAL VISUAL INSPECTION

- A. Final visual inspection will include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

3.8.3 FINAL AIR CLEARANCE TESTING

- A. After an acceptable final visual inspection by the CPIH, the CPIH shall perform the final testing. Air samples shall be collected and analyzed in accordance with AHERA regulations in this specification. If work is less than 260 LF/160 SF, 5 PCM samples shall be collected for clearance. If work is equal to or more than 260 LF/160 SF, TEM sampling shall be done for clearance. TEM analysis shall be done in accordance with procedures in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. **All additional inspection and testing costs will be borne by the Contractor.**
- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.8.4 FINAL AIR CLEARANCE PROCEDURES

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc or 70 s/mm² as measured with PCM/TEM methods
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the CPIH shall 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 0.8 μ MCE filters for PCM analysis and 0.45 μ Polycarbonate filters for TEM. A minimum of 1200 Liters of air shall be collected for clearance samples. Before pumps are started, initiate aggressive sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.

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

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

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

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

3.8.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES:

- A. The services of an AIHA accredited laboratory shall be employed by CPIH to perform analysis for the air samples. Samples shall be sent daily by the CPIH 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 VPIH and the Contractor.

3.8.8 LABORATORY TESTING OF TEM SAMPLES

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

3.9 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.9.1 COMPLETION OF ABATEMENT WORK

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

3.9.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.9.3 WORK SHIFTS

- A. All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday -Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative at no additional cost to the VA.

3.9.4 UNIT PRICES

- A. The Contractor must include in his/her bid the entire scope of work listed in 1.1.2. The Contractor shall include a unit price for all listed items below. Means and methods of removal will be at the discretion of the contractor with prior approval by the on site monitor and designer.
- B. Units prices listed below are inclusive of all related costs.
- C. Unit prices for addition shall not be more than 15% of the deduction unit prices.

	Addition	Deduction
1. Flooring Materials (per SF)	\$ _____	\$ _____
2. Pipe Insulation (per LF)	\$ _____	\$ _____
3. Hard Joint Insulation (each)	\$ _____	\$ _____
4. Ceiling and Wall Demolition (per SF)	\$ _____	\$ _____
5. Transite Panels Inside Radiators (per SF)	\$ _____	\$ _____
6. Fire Doors (each)	\$ _____	\$ _____

**ATTACHMENT #1
CERTIFICATE OF COMPLETION**

DATE:
PROJECT NAME:
VAMC/ADDRESS:

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building) which took place from _____ to _____.
2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5-f/cc except as described below.
7. That the negative pressure system was installed, operated and maintained in order to provide a minimum of 4 actual air changes per hour with a continuous -0.02" of water column pressure.

Signature/Date: _____

Signature/Date: _____

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. 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: _____

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: _____

ABATEMENT CONTRACTOR'S ADDRESS: _____

1. I verify that the following individual

Name: _____

Social Security Number: _____

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

Address: _____

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.
3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.
4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH: _____

Date: _____

Printed Name of CPIH: _____

Signature of Contractor: _____

Date: _____

Printed Name of Contractor: _____

ATTACHMENT #4

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

VA Project Location: _____

VA Project #: _____

VA Project Description: _____

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) have 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 of Section

SECTION 03 54 16
HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes hydraulic-cement-based underlayment for use as fill at deck and slab recesses where required to provide a level substrate for flooring.
- B. Include hydraulic-cement-based underlayment required by the drawings and specifications in the base bid.

1.2 RELATED WORK

- A. Quantity allowance for average underlayment thickness to be included in base bid: Section 01 21 00, ALLOWANCES
- B. Unit price for adjusting contract sum for unknown conditions work in excess of quantity under the scope of this section and allowances: Section 01 22 00, UNIT PRICES
- C. Section 02 41 00, DEMOLITION
- D. Flooring: Division 09 Sections.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: Plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- D. Manufacturer Certificates: Signed by manufacturers of both underlayment and floor covering system certifying that products are compatible.
- E. Qualification Data: For Installer.
- F. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

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- B. Product Compatibility: Manufacturers of both underlayment and floor covering system certify in writing that products are compatible.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature and humidity, ventilation, and other conditions affecting underlayment performance.
 - 1. Place hydraulic-cement-based underlayment only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

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):
 - C109/C109M-11..... Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch Cube Specimens)
 - C150/C150M-11..... Portland Cement
 - C219-07a Standard Terminology Relating to Hydraulic Cement
 - D4263-83(2005)..... Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 - F1869-10..... Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

1.8 COORDINATION

- A. Coordinate application of underlayment with requirements of floor covering products, including adhesives, specified in Division 09 Sections, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in applications and thicknesses indicated.

1. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 2. Compressive Strength: Not less than 4100 psi (28 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- E. If steel reinforcing in existing concrete recesses cutouts is exposed to view, provide corrosion-resistant coating recommended by underlayment manufacturer for metal substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions. Perform the following tests:
1. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m) in 24 hours.
 2. Perform plastic sheet test, ASTM D 4263 once for every 500 sq. ft (46.5 sq. m) of surface area to receive flooring. Proceed with application only after testing indicates absence of moisture in substrates
- C. Metal Substrates: Mechanically remove, according to manufacturer's written instructions, rust, foreign matter, and other contaminants that might impair underlayment bond. Apply corrosion-

resistant coating compatible with underlayment if recommended in writing by underlayment manufacturer.

- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum underlayment-to-substrate and inter-coat adhesion.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
 - 1. Apply a final layer without aggregate to produce smooth, uniform surface.
 - 2. Installation Tolerance: Limit variation in underlayment surface from level to 1/4 inch in 10 feet (6 mm in 3 m); noncumulative.
- D. Apply underlayment at the following locations:
 - 1. Where indicated on Drawings.
 - 2. Existing slab depression cutout at locations of removed existing terrazzo base.
 - 3. Full coverage underlayment at all concrete slab areas indicated to receive new finish flooring or floor coatings.
- E. Apply underlayment as follows:
 - 1. Apply at existing substrate high points in minimum thickness as recommended by underlayment manufacturer, but in no case less than thickness of 3.2 mm (1/8 inch).
 - 2. Apply as required to produce uniform, level finish surface, within indicated tolerances, and as required to meet substrate requirements of indicated finish flooring materials.
 - 3. Refer to Section 01 21 00 ALLOWANCES for average thickness quantity to be included in base bid.
- F. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- G. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- H. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a hollow sound when tapped.

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3.4 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

--- E N D ---

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
 - 1. Loose Lintels.

1.2 RELATED WORK

- A. Prime and finish painting: Section 09 91 00, PAINTING.
- B. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.
- C. Seismic criteria: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

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. Furnish setting drawings and instructions for installation of anchors to be preset into masonry work, and for the positioning of items having anchors to be built into 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.

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- B. Each product type shall be the same and be made by the same manufacturer.
- C. Assemble 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 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
 - B18.6.1-81(R1997)..... Wood Screws
 - B18.2.2-87(R2005)..... Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):
 - A36/A36M-08 Structural Steel
 - A307-10 Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - C1107/C1107M-11 Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
 - F436-11 Hardened Steel Washers
 - F468-10 Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
- D. American Welding Society (AWS):
 - D1.1-06 Structural Welding Code Steel
- E. International Building Code, International Code Council, Inc. (IBC):

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IBC 2009 International Building Code, 2009 Edition.

- F. American Society of Civil Engineers, Structural Engineering Institute(ASCE/SEI):
ASCE/SEI 7-05.....Minimum Design Loads for Buildings and Other Structures
including Supplements No. 1 and 2.
- G. National Association of Architectural Metal Manufacturers (NAAMM)
AMP 500-505-06Metal Finishes Manual
- H. Structural Steel Painting Council (SSPC):
SP 1-05No. 1, Solvent Cleaning
SP 2-05No. 2, Hand Tool Cleaning
SP 3-05No. 3, Power Tool Cleaning

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Provide ferrous metal products with average recycled content of products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

2.2 MATERIALS

- A. Structural Steel Plates, Shapes, and Bars: ASTM A36.
- B. Primer Paint: As specified in Section 09 91 00, PAINTING.
- C. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

- A. Rough Hardware:
 - 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
- 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.
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 serviceability of the finished product.

B. Size:

1. Size and thickness of members as shown, but not less than required to meet specified design criteria.
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, but not less than required to meet specified design criteria.

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, but not less than required to meet specified design criteria.
- b. Furnish members in longest lengths commercially available within the limits shown and specified.
- c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
- d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
- e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
- f. Prepare members for the installation and fitting of hardware.
- g. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:

- a. Weld in accordance with AWS.
- b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
- c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
- d. Finish welded joints to match finish of adjacent surface.

3. Joining:

- a. Miter or butt members at corners.
- b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.

4. Anchors:

- a. Where metal fabrications are shown to be 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.

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- f. Joints firm when assembled.
- g. Conceal joining, fitting and welding on exposed work as far as practical.
- h. Do not show rivets and screws prominently on the exposed face.
- i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:

- 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
- 2. Steel and Iron: NAAMM AMP 504.
 - a. Surfaces exposed in the finished work:
 - 1) Finish smooth rough surfaces and remove projections.
 - 2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
 - b. Shop Prime Painting:
 - 1) Surfaces of Ferrous metal:
 - a) Items not specified to have other coatings.
 - b) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
 - c) Clean off oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
 - d) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.

2.5 LOOSE LINTELS

- A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.
 - 1. Install lintels at the following locations:
 - a. Where indicated on Drawings.
 - b. Where existing masonry with lintel(s) is indicated for increased size of masonry opening.
 - c. Remove and re-install existing lintel(s) where required at existing masonry not indicated for increased size of masonry opening.
- B. Fabricate lintels in size to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 200 mm (8 inch) bearing at each end, unless otherwise indicated.
- C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
 - 1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
 - 2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).

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- D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- E. Provide bearing plates for lintels where shown.
- F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.
- G. Insert spreaders at bolt points to separate the angles for insertion of anchorage.
- H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

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 masonry.
 - 1. Provide temporary bracing for such items until masonry is set.
 - 2. Place in accordance with setting drawings and instructions.
 - 3. Build strap anchors, into masonry as work progresses.
- C. Field weld in accordance with AWS.
 - 1. Design and finish as specified for shop welding.
 - 2. Use continuous weld unless specified otherwise.
- D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- E. Spot prime all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

3.2 STEEL LINTELS

- A. Use lintel sizes and combinations shown or specified.
- B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.
- C. Install lintels to have not less than 200 mm (8 inch) bearing at each end for walls.

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**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies wood blocking, furring, nailers, rough hardware, and light wood construction.

1.2 RELATED WORK:

- A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.
- B. Metal supports and blocking located within wall partitions: 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. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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

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NDS-05.....Conventional Wood Frame Construction

C. American Society of Mechanical Engineers (ASME):

B18.2.1A-96(R2005) Square and Hex Bolts and Screws

B18.2.2-87(R2005)..... Square and Hex Nuts

B18.6.1-81 (R97) Wood Screws

B18.6.4-98(R2005)..... Thread Forming and Thread Cutting Tapping Screws and
Metallic Drive Screws

D. American Plywood Association (APA):

E30-07 Engineered Wood Construction Guide

E. American Society for Testing And Materials (ASTM):

A47/A47M-99(2009) Ferritic Malleable Iron Castings

A48/A48M-03(2008) 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

F844-07a Washers, Steel, Plain (Flat) Unhardened for General Use

F1667-11 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 in contact with plaster, masonry or concrete, including nailers, blocking, and other members.
3. Treat other members specified as preservative treated (PT).

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4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.2 PLYWOOD

- A. Comply with Prod. Std., PS 1.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

2.3 ROUGH HARDWARE

- 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. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.
 - 2. APA for installation of plywood panels.
- B. Fasteners:
 - 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use eight penny or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
 - c. Use 16 penny or larger nails for nailing through 50 mm (2 inch) thick lumber.
 - 2. Bolts:
 - a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Use toggle bolts to hollow masonry or sheet metal.
 - e. Use bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 600 mm (24 inch) intervals between end bolts. Use clips to beam flanges.
 - 3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
 - a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C 954 for steel over 0.84 mm (0.033 inch) thick.
 - 4. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.
 - 5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.
 - 6. Screws to Join Wood:
 - a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
- C. Cut notch, or bore in accordance with NFPA Manual for House-Framing for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

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- D. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Blocking, Nailers, and Furring:
 - 1. Install furring, blocking, nailers, and grounds where shown and where required to support facing materials, fixtures, specialty items, wall mounted items, and trim.
 - 2. Use longest lengths practicable.
 - 3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
 - 4. Layers of Blocking or Plates:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 600 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.
 - 5. Unless otherwise shown, use wall furring 25 mm by 75 mm (1 inch by 3 inch) continuous wood strips installed plumb on walls, using wood shims where necessary so face of furring forms a true, even plane. Space furring not over 400 mm (16 inches on centers, butt joints over bearings and rigidly secure in place. Anchor furring on 400 mm (16 inches) centers.

--- E N D ---

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior millwork.
- B. Items specified.
 - 1. Wood Bumper Rails.
 - 2. Wood Chair Rails.
 - 3. Shop Finishing of Woodwork.

1.2 RELATED WORK

- A. Furring and blocking: Section 06 10 00, ROUGH CARPENTRY.
- B. Wood doors: Section 08 14 00, INTERIOR WOOD DOORS.
- C. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Blocking and supports within wall partitions: Section 09 22 16, NON STRUCTURAL METAL FRAMING.
- E. Tackboards: Section 10 11 23, TACKBOARDS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Each item – Half full size scale for sections and details 1:48 (1/4-inch/1 ft.) for elevations and plans.
 - 2. Show construction and installation.
- C. Samples:
 - 1. Wood bumper rail with factory finish, 300 mm (twelve inch) length.
 - 2. Wood chair rail with factory finish, 300 mm (twelve inch) length.
- D. Certificates:
 - 1. Indicating moisture content of materials meet the requirements specified.

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- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.
- B. Store finishing lumber and millwork in weather-tight well ventilated structures or in space in existing buildings designated by Resident Engineer. Store at a minimum temperature of 21⁰C (70⁰F) for not less than 10 days before installation.
- C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

1.5 APPLICABLE PUBLICATIONS

- A. 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):
F436-11.....Hardened Steel Washers
- C. American Society of Mechanical Engineers (ASME):
B18.2.1-96(R2005)Square and Hex Bolts and Screws (Inch Series)
- D. Architectural Woodwork Institute (AWI):
AWI-05Architectural Woodwork Quality Standards and Quality
Certification Program
- E. Federal Specifications (Fed. Spec.):
A-A-1922AShield Expansion
FF-N-836DNut, Square, Hexagon Cap, Slotted, Castle
FF-S-111D(1).....Screw, Wood
MM-L-736(C)Lumber, Hardwood

PART 2 - PRODUCTS

2.1 LUMBER

- A. Grading and Marking:

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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.
4. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

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.

2.2 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by 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.

2.3 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.

2.4 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. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.

4. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.

B. Standing and Running Trim:

1. Solid hardwood.
 - a. Wood Species and Cut: Red Oak, plain sawn.
 - b. Profiles: As indicated on Drawings.
 - c. Thickness: As indicated on Drawings.
 - d. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.5 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Shop-finish items under this section at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing items, as applicable to each unit of work.
 1. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of end-grain surfaces.
- D. Transparent Finish:
 1. AWI Finish System: Catalyzed vinyl.
 2. Staining: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 3. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that surfaces and conditions in which millwork are to be installed are free of irregularities or conditions that would interfere with proper installation.
- B. Maintain work areas and storage areas to a minimum temperature of 21⁰C (70⁰F) for not less than 10 days before and during installation of interior millwork.
- C. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- D. Before installing millwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.
- E. 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.

- F. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. AWI Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
2. Verify items have received shop-applied back-primer. Millwork receiving transparent finish shall be primed and back-painted on concealed surfaces. Set no millwork until primed and back-painted.
3. Secure trim with fine finishing nails or screws.
4. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
5. Plumb and level items unless shown otherwise.
6. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

- B. Bumper Rails: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members.

1. Secure bumper rails to walls with concealed mounting to solid hardwood mounting blocks or strips. Anchor to wall at maximum 600 mm (24 inches) on center.

- C. Install trim with scarfed running joints in straight runs and miter at corners.

- D. Install standing and running trim with no more variation from a straight line than 3 mm in 2400 mm (1/8 inch in 96 inches).

- E. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

--- E N D ---

**SECTION 07 84 00
FIRESTOPPING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Through-penetration firestop systems for closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction, including both empty openings and openings containing penetrating items.
- B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK

- A. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- B. Sealants and application: Section 07 92 00, JOINT SEALANTS.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Comply with requirements of NFPA 101.
 - 1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.
 - 2. Fire-resistance-rated horizontal assemblies including floors, roofs and horizontal shaft wall assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.

- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 100 mm (4 inches) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's literature, data, and installation instructions for types of firestopping and smoke stopping used.
 - 1. Include information on identification labeling.
- C. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Subject to acceptance by authority having jurisdiction, where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
 - 3. Submit documentation for existing penetrations that were repaired or replaced with new through-penetration firestop system.
 - 4. Submit documentation for identification labeling.
- D. List of UL classification number of systems installed.
- E. Certified laboratory test reports for ASTM E814 tests for each system proposed for use.
- F. Product Certificates: For each through-penetration firestop system, signed by product manufacturer, indicating products comply with requirements and do not contain asbestos or lead.
- G. Qualification Data: For qualified Installer.

1.5 DELIVERY AND STORAGE

- A. Deliver materials in their original unopened containers with manufacturer's name and product identification.
- B. Store in a location providing protection from damage and exposure to the elements.

1.6 WARRANTY

- A. Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

1.7 QUALITY ASSURANCE

- A. UL or other NFPA approved laboratory tested products are acceptable.
- B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL. Other agencies performing testing and follow-up inspection services for firestop systems are not acceptable unless approved in writing by authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - E84-10b Surface Burning Characteristics of Building Materials

E814-06 Fire Tests of Through-Penetration Fire Stops

C. National Fire Protection Association (NFPA):

NFPA 101 Life Safety Code, 2009 Edition.

D. Underwriters Laboratories, Inc. (UL):

1. Annual Issue Building Materials Directory
2. Annual Issue Fire Resistance Directory

1479-03 Fire Tests of Through-Penetration Firestops

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Resident Engineer has examined each installation.
 1. Inspection of Firestopping at Existing Rated Construction: Notify Resident Engineer at least 48 hours in advance of times when working in areas of existing rated construction. Upon completion of firestopping penetrations at existing rated construction, request an inspection for approval by VA FMS.

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 stopping 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 m² (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. UL rated or tested by an approved laboratory in accordance with ASTM E814.
- H. Materials shall be asbestos free.
- I. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- J. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.

5. Steel sleeves.

K. VOC Content: Provide systems that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

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, provide systems capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials that comply with VOC requirements and are indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

- I. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping, gunnable sealant, unless indicated firestop system limits use to non-sag grade for both opening conditions.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. 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.
- C. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

- E. Existing Penetrations: Remove incompatible materials in place prior to installation of firestopping system.

3.3 INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- C. Install firestopping systems with smoke stopping in accordance with UL or other approved system details and installation instructions.
- D. Install smoke stopping seals in smoke partitions. Install on one side of partition only.
- E. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- F. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- G. Existing Rated Construction: Install through-penetration firestop systems and smoke stopping where penetrating existing fire-rated and smoke-rated construction.
 - 1. Complete installation of through-penetration firestop system no later than 4 hours after making penetration.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. Verify required wording and content with Resident Engineer prior to fabricating labels.
 - 2. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage" or similar wording as required by Resident Engineer.
 - 3. Contractor's name, address, and phone number.

4. Through-penetration firestop system designation of applicable testing and inspecting agency.
5. Date of installation.
6. Through-penetration firestop system manufacturer's name.
7. Installer's name.

3.5 CLEAN-UP AND ACCEPTANCE OF WORK

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.
- C. As work on each floor is completed, remove materials, litter, and debris.
- D. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.
- E. Clean up spills of liquid type materials.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems with No Penetrating Items:
 1. UL-Classified Systems: C-AJ- C-BJ- F-A- W-J- W-L- 0001-0999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- C. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
 1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-A- F-B- F-C- W-J- W-K- W-L- 1001-1999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:

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1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 2001-2999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
 - e. Firestop device.
- E. Firestop Systems for Electrical Cables:
1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 3001-3999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Silicone foam.
 - e. Pillows/bags.
- F. Firestop Systems for Cable Trays:
1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-K- W-L- 4001-4999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Pillows/bags.
 - e. Mortar.
- G. Firestop Systems for Insulated Pipes:
1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-C- W-J- W-L- 5001-5999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.
- H. Firestop Systems for Miscellaneous Electrical Penetrations:
1. UL-Classified Systems: C-AJ- F-A- W-L- 6001-6999.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Mortar.
- I. Firestop Systems for Miscellaneous Mechanical Penetrations:
1. UL-Classified Systems: C-AJ- F-C- W-J- W-L- 7001-7999.
 2. Type of Fill Materials: One or both of the following:

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- a. Latex sealant.
- b. Mortar.

J. Firestop Systems for Groupings of Penetrations:

- 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-C- W-J- W-L- 8001-8999.
- 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
 - c. Intumescent wrap strips.
 - d. Firestop device.
 - e. Intumescent composite sheet.

--- E N D ---

**SECTION 07 92 00
JOINT SEALANTS**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK:

- A. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.
- B. Glazing: Section 08 80 00, GLAZING.
- C. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.

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. VOC: Acrylic latex and Silicone 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.
- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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 or Backer 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 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.
 - C612-10.....Mineral Fiber Block and Board Thermal Insulation.
 - C717-10.....Standard Terminology of Building Seals and Sealants.

C834-10.....	Latex Sealants.
C919-08.....	Use of Sealants in Acoustical Applications.
C920-10.....	Elastomeric Joint Sealants.
C1021-08.....	Laboratories Engaged in Testing of Building Sealants.
C1193-09.....	Standard Guide for Use of Joint Sealants.
C1330-02 (R2007).....	Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
D1056-07.....	Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
E84-10b.....	Surface Burning Characteristics of Building Materials.

C. Sealant, Waterproofing and Restoration Institute (SWRI).

1. The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS:

A. S-1: NOT USED.

B. S-2: NOT USED.

C. S-3: NOT USED.

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: NOT USED

F. S-6: NOT USED.

G. S-7: NOT USED.

H. S-8: NOT USED.

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.

2.2 CAULKING COMPOUND:

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

- A. Sealants used with unpainted concrete shall match color of adjacent concrete.
- B. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.
- C. Caulking shall be light gray or white, unless specified otherwise.

2.4 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 FILLER:

- A. Mineral fiber board: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.7 CLEANERS-NON POURIOUS SURFACES:

- A. Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.

- d. Glazed surfaces of ceramic tile.
 - C. Do not cut or damage joint edges.
 - D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
 - E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
 - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 - 2. Use brush or other approved means that will reach all parts of joints.
 - F. Take all necessary steps to prevent three sided adhesion of sealants.
- 3.3 BACKING INSTALLATION:
- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
 - B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
 - C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
 - D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
 - E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
 - F. Take all necessary steps to prevent three sided adhesion of sealants.
- 3.4 SEALANT DEPTHS AND GEOMETRY:
- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
 - B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.
- 3.5 INSTALLATION:
- A. General:

1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
 2. Do not use 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.
 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 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.
- 3.7 LOCATIONS:
- A. Sanitary Joints:
 1. Pipe Penetrations: Type S-9
 - B. Interior Caulking:

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1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1, C-2.
2. Perimeter of Doors and Windows which Adjoin Concrete or Masonry Surfaces: Types C-1, C-2.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1, C-2.
4. Perimeter of Gypsum Wallboard Walls: Types C-1, C-2.
5. Exposed Isolation Joints at Top of Full Height Walls: Types C-1, C-2.
6. Exposed Acoustical Joint at Sound Rated Partitions: Type C-2
7. Concealed Acoustic Sealant Types S-4, C-1, C-2.

--- E N D ---

SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies floor, wall and ceiling seismic and building expansion joint assemblies.

1.2 RELATED WORK

- A. Color of Elastomer Inserts, Flooring Inlays, and Metal Finishes: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 QUALITY ASSURANCE

- A. Project Conditions:
 - 1. Check actual locations of walls and other construction, to which work must fit, by accurate field measurements before fabrication.
 - 2. Show recorded measurements on final shop drawings.
- B. Fire tests performed by Factory Mutual, Underwriters Laboratories, Inc., Warnock Hersey or other approved independent testing laboratory.

1.4 DELIVERY STORAGE AND HANDLING

- A. Take care in handling of materials so as not to injure finished surface and components.
- B. Store materials under cover in a dry and clean location off the ground.
- C. Remove materials which are damaged or otherwise not suitable for installation from job site and replace with acceptable materials.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Submit copies of manufacturer's current literature and data for each item specified.
 - 2. Clearly indicate movement capability of cover assemblies.

- C. Certificates: Material test reports from approved independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements specified.
- D. Shop Drawings:
 - 1. Showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joiners with other type assemblies, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes.
 - 2. Include description of materials and finishes and installation instructions.
- E. Samples:
 - 1. Samples of each type and color of flexible seal and sealant used in work.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed form part of this specification to extent referenced. Publications are referred to in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - B209-07 Aluminum and Aluminum-Alloy Sheet and Plate
 - B221-08 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - C864-05 Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
 - C920-10 Elastomeric Joint Sealants
 - D1187-97 (2002)e1 Asphalt Base Emulsions for Use as Protective Coatings for Metal
 - D2287-96 (2010) Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
 - E119-10a Fire Tests of Building Construction and Materials
 - E814-10 Fire Tests of Through-Penetration Fire Stops
 - E1612-94(2009) Preformed Architectural Compression Seals for Buildings and Parking Structures
 - E1783-96(2009) Preformed Architectural Strip Seals for Buildings and Parking Structures
- C. Federal Specifications (Fed. Spec):
 - TT-P-645B Primer, Paint, Zinc-Molybdate, Alkyd Type
- D. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual.

E. National Fire Protection Association (NFPA):

251-05 Tests of Fire Endurance of Building Construction and Materials

F. Underwriters Laboratories Inc. (UL):

263-03 Fire Tests of Building Construction and Materials

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 MATERIALS

A. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5.
2. Plate and Sheet: ASTM B209, alloy 6061-T6.

B. Elastomeric Sealant:

1. ASTM C920, polyurethane.
2. Type.
3. Class 25.
4. Grade P or NS.
5. Shore A hardness 25, unless specified otherwise.

C. Gasket Seals: Extruded pure silicone; elastic.

D. Strip Seals: Elastomeric membrane or tubular extrusions with a continuous longitudinal internal baffle system throughout complying with ASTM E 1783; used with compatible frames, flanges, and molded-rubber anchor blocks.

E. Compression Seals: Preformed, elastomeric extrusions having internal baffle system complying with ASTM E 1612 in sizes and profiles indicated or as recommended by manufacturer.

F. Thermoplastic Rubber:

1. ASTM C864.
2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.

G. Fire Barrier:

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1. Designed for indicated or required dynamic structural movement without material degradation or fatigue.
2. Tested in maximum joint width condition as a component of an expansion joint cover assembly in accordance with UL 263 NFPA 251, or ASTM E119 and E814, including hose steam test at full-rated period.

H. Zinc-Molybdate Primer: Fed. Spec. TT-P-645.

I. Accessories:

1. Manufacturer's standard anchors, fasteners, set screws, spaces, flexible secondary water stops or seals and filler materials, drain tubes, adhesive and other accessories as indicated or required for complete installations.
2. Compatible with materials in contact.

2.3 FABRICATION

A. General:

1. Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
2. Deliver to job site ready for use and fabricated in as large sections and assemblies as practical. Assemblies identical to submitted and reviewed shop drawings, samples and certificates.
3. Furnish units in longest practicable lengths to minimize number of end joints. Provide mitered corners where joint changes directions or abuts other materials.
4. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
5. Fire Performance Characteristics:
 - a. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.
 - b. Fire rating: Not less than rating of adjacent floor or wall construction.
6. Fire Barrier Systems:
 - a. Material to carry label of approved independent testing laboratory, and be subject to follow-up system for quality assurance.
 - b. Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.
 - c. For joint widths up to and including 150 mm (six inches), supply barrier in lengths up to 15000 mm (50 feet) to eliminate field splicing.
 - d. For joints within enclosed spaces such as chase walls, include 1 mm (0.032-inch) thick galvanized steel cover where conventional expansion joint cover is not used.
7. Seal Strip factory - formed and bonded to metal frames and anchor members.
8. Compression Seals: Prefabricate from thermoplastic rubber or dense neoprene to sizes and approximate profiles shown.

B. Floor-to-Floor Joint System:

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1. Type: Dual elastomeric seal with finish floor inlay.
 - a. Exposed Metal: Aluminum.
 - 1) Finish: Mill or clear anodized.
 - b. Seal Material: Santoprene or manufacturer's standard.
 - 1) Color: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 2. Movement Capability: Plus or minus 65 percent.
 3. Type of Movement: Thermal and Seismic.
 4. Cover-Plate Design: Recessed to accept field-applied finish materials.
 - a. Recess Depth: 3 mm (1/8 inch).
 5. Attachment Method: Mechanical anchors.
 6. Load Capacity: Standard duty.
 7. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a rating not less than that of adjacent construction.
- C. Wall-to-Wall Joint System:
1. Type: Elastomeric seal.
 - a. Exposed Metal: Aluminum.
 - 1) Finish: Mill or clear anodized.
 - b. Seal Material: Santoprene or manufacturer's standard.
 - 1) Color: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 2. Movement Capability: Plus 25 percent, minus 70 percent.
 3. Type of Movement: Thermal and Seismic.
- D. Ceiling-to-Ceiling Joint System:
1. Type: Elastomeric seal.
 - a. Exposed Metal: Aluminum.
 - 1) Finish: Mill or clear anodized.
 - b. Seal Material: Santoprene or manufacturer's standard.
 - 1) Color: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 2. Movement Capability: Plus 25 percent, minus 70 percent.
 3. Type of Movement: Thermal and Seismic.

2.4 METAL FINISHES

A. General:

1. Apply finishes in factory after products are fabricated.
2. Protect finishes on exposed surfaces with protective covering before shipment.

B. Aluminum Finishes:

1. Finish letters and numbers for anodized aluminum are in accordance with the NAAMM AMP 501, Aluminum Association's Designation System).
 - a. Mill Finish: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to remove scratches, welding, or grinding produced in fabrication process.)
 - b. Clear anodized finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker..
2. Factory-Primed Concealed Surface: NAAMM AMP 505 Protect concealed aluminum surfaces that will be in contact with plaster, concrete or masonry surfaces when installed by applying a shop coat of zinc-molybdate primer to contact surfaces. Provide minimum dry film thickness of 2.0 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Manufacturer's representative shall make a thorough examination of surfaces receiving work of this section.
- B. Examine surfaces and block-outs where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Verify measurements and dimensions at job site and cooperate in coordination and scheduling of work with work of related trades.
- B. Give particular attention to installation of items embedded in concrete and masonry so as not to delay job progress.
- C. Provide templates to related trade for location of support and anchorage items.
- D. Prepare substrates according to joint system manufacturer's written instructions.
- E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure joint systems to in-place construction. Provide tamper-proof fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.3 INSTALLATION

- A. Install in accordance with manufacturers installation instructions unless specified otherwise.
- B. Provide anchorage devices and fasteners for securing expansion joint assemblies to in-place construction including threaded fasteners with drilled-in fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide metal fasteners of type and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.
- C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.
- D. Install joint cover assemblies in true alignment and proper relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.
- E. Allow for thermal expansion and contraction of metal to avoid buckling.
- F. Set floor assemblies top surface at elevations flush with adjacent finished floor materials unless shown otherwise.
- G. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.
- H. Locate anchors at interval recommended by manufacturer, but not less than 75 mm (3-inches) from each ends, and, not more than 600 mm (24-inches) on centers.
- I. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.
- J. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames or plates.
- K. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.
 - 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints to provide watertight joints using procedures as recommended by manufacturer.
 - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- L. Fire Barriers:
 - 1. Install in compliance with tested assembly.
 - 2. Install in floors and in fire rated walls.
 - 3. Use fire barrier sealant or caulk supplied with system.
- M. Sealants:
 - 1. Install to prevent water and air infiltration.

3.4 PROTECTION

- A. Take proper precautions to protect the expansion joint covers from damage after they are in place.
- B. Cover floor joints with plywood where wheel traffic occurs.
- C. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

--- E N D ---

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel frames and related components.
- B. Terms relating to steel frames as defined in ANSI/SDI A250.8 and as specified.

1.2 RELATED WORK

- A. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- B. Glazing: Section 08 80 00, GLAZING.

1.3 TESTING

- A. An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data:
 - 1. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements.
- C. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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 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. Door and Hardware Institute (DHI):
 - A115 Series Steel Door and Frame Preparation for Hardware, Series A11 through A11 (Dates Vary)
- C. Steel Door Institute (SDI):
 - A250.8-03 Standard Steel Doors and Frames
- D. American Society for Testing and Materials (ASTM):
 - A568/568M-11a Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled
 - A1008/A1008M-11 Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability
- E. The National Association Architectural Metal Manufacturers (NAAMM):
 - Metal Finishes Manual (2006 Edition)
- F. National Fire Protection Association (NFPA):
 - 80-10 Fire Doors and Fire Windows
 - 105-10 Standard for the Installations of Smoke Door Assemblies and Other Opening Protectives
- G. Underwriters Laboratories, Inc. (UL):
 - Fire Resistance Directory
- H. Intertek Testing Services (ITS):
 - Certifications Listings... Latest Edition
- I. 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, Commercial Steel (CS), Type B; suitable for exposed applications.
- 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.
- D. Acoustical Insulation: Mineral fiber batt or blankets, ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.
 - 1. Thickness as shown or if not shown use thickness to fill stud depth; of widths and lengths to fit tight against framing.

2.2 FABRICATION GENERAL

- A. GENERAL:
 - 1. Follow SDI A250.8 for fabrication of standard steel door frames, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per SDI A250.8.

2.3 METAL FRAMES

- A. General:
 - 1. SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
 - 2. Frames for labeled fire rated doors and windows.
 - a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
 - b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
 - 3. Frames for doors specified to have automatic door operators; Minimum 1.7 mm (0.067 inch) thick.
 - 4. Fabricate frames as full-profile-welded unless otherwise indicated. Knocked-down frames are not acceptable unless indicated otherwise.
 - a. Knocked-down frames are acceptable where frames are installed within existing masonry openings and installation of full-profile-welded frames is not feasible.
- B. Reinforcement and Covers:
 - 1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.

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- C. Terminated Stops: SDI A250.8.
- D. Glazed Openings:
 - 1. Integral stop on corridor or secure side of door.
 - 2. Design rabbet width and depth to receive glazing material or panel shown or specified.
- E. Frame Anchors:
 - 1. Floor anchors:
 - a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
 - b. At bottom of jamb use mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts.
 - c. Where 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 (2 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

- A. SDI A250.8.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11.
 - 1. At fire-rated openings, install frames according to NFPA 80.
 - 2. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - 3. Install frames with removable stops located on secure side of opening.
 - 4. Install door silencers in frames before grouting.
- C. Floor Anchors:
 - 1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
 - 2. Power actuated drive pins may be used to secure frame anchors to concrete floors.
- D. 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.

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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.
- E. Install anchors for labeled fire rated doors to provide rating as required.
- F. Metal-Stud Partitions: Solidly pack mineral-fiber acoustical insulation behind frames.
- G. Glazing: Comply with installation requirements in Section 08 80 00, GLAZING and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 230 mm (9 inches) o.c. and not more than 50 mm (2 inches) o.c. from each corner.

3.3 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

- A. Install doors and hardware as specified in Section 08 14 00, INTERIOR WOOD DOORS, Section 08 71 00, DOOR HARDWARE.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

--- E N D ---

SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior flush solid core wood doors.
- B. Section includes fire rated doors and smoke-rated doors.

1.2 RELATED WORK

- A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.
- C. Installation of doors and hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, INTERIOR WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.
- D. Glazing: Section 08 80 00, GLAZING.
- E. Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Corner section of flush veneered door 300 mm (12 inches) square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
 - 2. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species with factory transparent finish.
- 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, sound gasketing, and pertinent details.
 - 3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.
- D. Manufacturer's Literature and Data:

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1. Flush wood doors.
2. 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.

F. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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, J-1 Job Site Information.
- C. Label package for door opening where used.

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. Window and Door Manufacturers Association (WDMA):

- I.S.1-A-04.....Architectural Wood Flush Doors
T.M.5-90.....Split Resistance Test Method
T.M.6-08.....Adhesive (Glue Bond) Durability Test Method
T.M.7-08.....Cycle-Slam Test Method
T.M.8-08.....Hinge Loading Test Method
T.M.10-08.....Screwholding Test Method

C. National Fire Protection Association (NFPA):

- 80-10.....Protection of Buildings from Exterior Fire

105-10.....	Standard for the Installations of Smoke Door Assemblies and Other Opening Protectives
252-08.....	Fire Tests of Door Assemblies

PART 2 - PRODUCTS

2.1 FLUSH SOLID-CORE WOOD 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: Custom Grade. Plain sliced Select White Maple.
 - a. "A" grade face veneer.
 - b. Match face veneers for doors for uniform effect of color and grain at joints.
 - c. Door edges shall be same species as door face veneer.
4. Factory sand doors for factory finishing.

C. Wood for stops, muntins and moldings of flush doors required to have transparent finish:

1. Solid Wood of same species as face veneer.
2. Glazing:
 - a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.
3. Wood Louvers:
 - a. Door manufacturer's standard product, fabricated of solid wood sections.
 - b. Wood Slats: Not less than 5 mm (3/16 inch) thick.
 - c. Stiles routed out to receive slats.
 - d. Secure louvers in prepared cutouts with wood stops.

D. Stiles and Rails:

1. Option for wood stiles and rails:
 - a. Composite material having screw withdrawal force greater than minimum performance level value when tested in accordance with WDMA T.M.10.

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2. Provide adequate blocking for bottom of doors having mechanically operated door bottom seal meeting or exceeding the performance duty level per T.M.10 for horizontal door edge screw holding.
 3. Provide adequate blocking as needed to eliminate through-bolting hardware.
- E. Fire rated wood doors:
1. Fire Performance Rating:
 - a. "B" label, 1-1/2 hours.
 - b. "C" label, 3/4 hour.
 2. Labels:
 - a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
 - b. Metal labels with raised or incised markings.
 3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:
 - a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.
 - b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
 - c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA T.M.7.
 4. Additional Hardware Reinforcement:
 - a. Provide fire rated doors with hardware reinforcement blocking.
 - b. Size of lock blocks as required to secure hardware specified.
 - c. Top, bottom and intermediate rail blocks shall measure not less than 125 mm (five inches) minimum by full core width.
 - d. Reinforcement blocking in compliance with manufacturer's labeling requirements.
 - e. Provide adequate blocking as needed to eliminate through-bolting hardware.
 - f. Mineral material similar to core is not acceptable.
 5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.
 6. Provide wood-veneered beads approved for use in labeled doors for vision panels.
 - a. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
 7. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 8. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals on pair of doors.

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- F. Smoke Barrier Doors: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

- 1. For glazed openings use wood-veneered beads approved for use in labeled doors.

2.2 FABRICATION

- A. Flush doors shall be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.
- B. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of WDMA I.S.1-A for fitting unless otherwise indicated, but in no case less than the following.
 - 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, and doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with Section 08 71 00, DOOR HARDWARE. Comply with final hardware schedules, door frame Shop Drawings, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- D. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.
- E. Openings: Cut and trim openings through doors in factory.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00, GLAZING.
- F. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.
- G. Flush doors to receive transparent finish (in addition to being pre-fit) shall 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. Use stain when required to produce the finish specified in Section 09 06 00 SCHEDULE FOR FINISHES.

2.3 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.

2.4 SEALING:

- A. Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, clearances, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
 - 2. Smoke-Control Doors: Install doors according to NFPA 105.
- B. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- C. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- D. Do not violate the qualified testing and inspection agency label requirements for fire rated doors.
- E. Hardware installation and location heights specified in Section, 08 71 00 DOOR HARDWARE.
- F. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.

3.3 INSTALLATION OF DOORS, APPLICATION OF HARDWARE

- A. Install hardware as specified in Section, 08 71 00 DOOR HARDWARE.

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3.4 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 Resident Engineer.

3.5 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

--- 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
- C. Electrical: Division 26, ELECTRICAL.

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, if possible, except as otherwise specified:
 - 1. Mortise locksets.
 - 2. Hinges for hollow metal and wood doors.
 - 3. Surface applied overhead door closers.
 - 4. Exit devices.
 - 5. Floor closers.

1.4 WARRANTY

- A. Automatic door operators shall be subject to the terms of FAR Clause 52.24-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:
 - 1. Locks, latchsets, and panic hardware: 5 years.
 - 2. Door closers and continuous hinges: 10 years.

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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.

1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23 plus 2 copies to the VAMC Locksmith (VISN Locksmith if the VAMC does not have a locksmith).
- 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 Resident Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Resident Engineer's office until all other similar items have been installed in project, at which time the Resident Engineer will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 PREINSTALLATION MEETING

- A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including but not limited to Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:
1. Inspection of door hardware.
 2. Job and surface readiness.
 3. Coordination with other work.
 4. Protection of hardware surfaces.
 5. Substrate surface protection.
 6. Installation.
 7. Adjusting.
 8. Repair.
 9. Field quality control.
 10. Cleaning.

1.9 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Best	Best Access Systems	Indianapolis, IN
Don-Jo	Don-Jo Manufacturing	Sterling, MA
G.E. Security	GE Security, Inc.	Bradentown, FL
Markar	Markar Architectural Products	Pomona, CA
Pemko	Pemko Manufacturing Co.	Ventura, CA
Rixson	Rixson	Franklin Park, IL
Rockwood	Rockwood Manufacturing Co.	Rockwood, PA
Securitron	Securitron Magnalock Corp.	Sparks, NV
Sargent	Sargent Lock	New Haven, CT
Stanley	The Stanley Works	New Britain, CT

- C. Keying: All cylinders shall be keyed into existing Sargent KESO Interchangeable Core System as directed by VA Project Engineer. Provide removable core cylinders that are removable only with a

special key or tool without disassembly of the lockset. Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the Resident Engineer.

- D. Keying: Two (2) new Master Key Systems shall be established for this project. The Key System shall be the same format (Sargent KESO) removable core type as previously described. The key blanks shall be protected by a utility patent with a minimum seven years remaining on the patent from the start of construction, and protected by contract-controlled distribution. The manufacturer shall furnish code pattern listings in both paper and electronic formats so keys may be reproduced by code.; provide electronic format in file type required by project's key control software. The manufacturer shall design the new key system with the capacity to rekey the existing system and also provide for 25 percent expansion capability beyond this requirement. Submit a keying chart for approval showing proposed keying layout and listing expansion capacity.
1. Keying information will be furnished to the Contractor by the Resident Engineer or VA Locksmith.
 2. Supply information regarding key control of cylinders for locks to manufacturers of equipment having cylinder type locks. Notify Resident Engineer immediately when and to whom keys or keying information is supplied. Return all such keys to the Resident Engineer.

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
- A156.3-08.....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
- A156.13-05.....Mortise Locks and Latches Series 1000
- A156.14-07Sliding and Folding Door Hardware

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- 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
- A156.25-07Electrified Locking Devices
- A156.26-06.....Continuous Hinges
- A156.28-07Master Keying Systems
- A156.29-07Exit Locks and Alarms
- A156.31-07Electric Strikes and Frame Mounted Actuators
- A250.8-03.....Standard Steel Doors and Frames
- D. National Fire Protection Association (NFPA):
 - 80-10Fire Doors and Fire Windows
 - 101-09Life Safety Code
- E. Underwriters Laboratories, Inc. (UL):
 - Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. ANSI A156.1. Provide only three-knuckle Heavy Weight hinges. No Five Knuckle Hinges shall be used. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
 - 1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 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/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.
- B. Provide quantity and size of hinges per door leaf as follows:
 - 1. Doors up to 1210 mm (4 feet) high: 2 hinges.

2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
7. Provide heavy-weight hinges where specified.
8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

2.2 CONTINUOUS HINGES

- A. ANSI/BHMA A156.26, Grade 1-600.
 1. Listed under Category N in BHMA's "Certified Product Directory."
- B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete
- C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
 1. Base Metal for all Continuous Hinges: Stainless steel.
 2. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
 3. Provide with manufacturer's cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
 4. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
 5. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer's adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

2.3 DOOR CLOSING DEVICES

- A. Closing devices shall be products of one manufacturer 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 FLOOR CLOSERS AND FLOOR PIVOT SETS

- A. Comply with ANSI A156.4. Provide stainless steel floor plates for floor closers and floor pivots, except where metal thresholds occur. Provide cement case for all floor closers. Floor closers specified for fire doors shall comply with Underwriters Laboratories, Inc., requirements for concealed type floor closers for classes of fire doors indicated on drawings. Hold-open mechanism, where required, shall engage when door is opened 105 degrees, except when door swing is limited by building construction or equipment, the hold-open feature shall engage when door is opened approximately 90 degrees. The hold-open mechanism shall be selectable on/off by turning a screw through the floor plate. Floor closers shall have adjustable hydraulic back-check, adjustable close speed, and adjustable latch speed. Provide closers with delayed action where a hold-open mechanism is not required. Floor closers shall be multi-sized. Single acting floor closers shall also have built in dead stop. Where required, provide closers with special cement cases appropriate for shallow deck installation or where concrete joint lines run through the floor blockout. At offset-hung doors installed in deep reveals, provide special closer arm and spindle to allow for installation. Where stone or terrazzo is applied over the floor closer

case, provide closer without floor plate and with extended spindle (length as required) and special cover pan (depth as required) to allow closer to be accessed without damaging the material applied over the closer. Pivots for non-labeled doors shall be cast, forged or extruded brass or bronze.

- B. Where floor closer appears in hardware set provide the following as applicable.
 - 1. Double Acting Floor Closers: Type C06012.
 - 2. Single Acting Floor Closer: Type C06021 (center pivoted). (Intermediate pivot is not required).
 - 3. Single Acting Floor Closers: Type C06041 (offset pivoted).
 - 4. Single Acting Floor Closer for Labeled Fire Doors: Type C06051 (offset pivoted).
 - 5. Single Acting Floor Closers For Lead Lined Doors: Type C06071 (offset pivoted).

2.6 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. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
- D. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
- E. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.
- F. Omit stops where floor mounted door holders are required and where automatic operated doors occur.
- G. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.
- H. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.
- I. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.
- J. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.

- K. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.7 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.

2.8 FLOOR DOOR HOLDERS

- A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.9 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 be Sargent KESO Security Cylinders and shall not have less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core of allow opening and closing during construction and prior to the installation of final cores.
- B. In addition to above requirements, locks and latches shall comply with following requirements:
 - 1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 1. All locksets and latchsets, except on designated doors in Psychiatric (Mental Health) areas, shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design matching Sargent 8200 x LNJ. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Lock function F02 (modified with Visual Indicator) shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.
 - 2. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.5.

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3. Locks on designated doors in Psychiatric (Mental Health) areas shall be paddle type with arrow projection covers and be UL Listed. Provide these locks with paddle in the down position on both sides of the door. Locks shall be fabricated of wrought stainless steel.
4. Privacy locks in non-mental-health patient rooms shall have an inside thumbturn for privacy and an outside keyed cylinder for emergency entrance. Single occupancy patient privacy doors shall typically swing out; where such doors cannot swing out, provide center-pivoted doors with rescue hardware.

2.10 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.

2.11 ELECTROMAGNETIC LOCKS

- A. ANSI/BHMA A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door. Listed under Category E in BHMA's "Certified Product Directory."
 1. Type: Full exterior or full interior, as required by application indicated.
 2. Strength Ranking: 1500 lbf (6672 N)
 3. Inductive Kickback Peak Voltage: Not more than 53V.
 4. Residual Magnetism: Not more than 4 lbf (18 N) to separate door from magnet.
- B. Delayed-Egress Locks: BHMA A156.24.// Listed under Category G in BHMA's "Certified Product Directory".
 1. Means of Egress Doors: Lock releases within 15 seconds after applying a force not more than 15 lbf (67 N) for not more than 3 seconds, as required by NFPA 101.
 2. Security Grade: Activated from secure side of door by initiating device.
 3. Movement Grade: Activated by door movement as initiating device.
 4. The lock housing shall not project more than 4-inches (101mm) from the underside of the frame head stop.

2.12 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-secure electric strikes at fire-rated doors.

2.13 KEYS

- A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
------------	----------

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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.

2.14 KEY CABINET

- A. ANSI Standard A156.5. Provide key cabinet made of cold rolled, 1.2 mm (0.0478 inch) thick furniture steel electro-welded. Doors shall have "no sag" continuous brass-pin piano type hinge and be equipped with chrome plated locking door handles, hook cam and mechanical pushbutton door lock. Key Cabinet and Key Control System shall accommodate all keys for this project plus 25 percent. Provide minimum number of multiple cabinets where a single cabinet of largest size will not accommodate the required number of keys.
- B. Key tags shall consist of two sets: Permanent self-locking and loan key snaphook type with tag colors as follows: Red fiber marker of the permanent self-locking type approximately 32 mm (1-1/4 inch) in diameter engraved with the legend "FILE KEY MUST NOT BE LOANED." Also furnish for each hook a white cloverleaf key marker with snap-hooks engraved with the legend "LOAN KEY."
- C. The manufacturer of the lock cylinders and locks shall attach a key tag to keys of each lock cylinder and shall mark thereon the respective item number and key change number. Provide each group of keys in a key gathering envelope (supplied by Key Cabinet Manufacturer) in which the lock manufacturer shall include the following information: Item number, key change number and door number. The contractor shall furnish the Key Cabinet Manufacturer the hardware and keying schedules and change keys.
- D. The Key Cabinet Manufacturer shall set up a three-way cross index system, including master keys, listing the keys alphabetically, the hooks numerically and the key changes numerically on different colored index cards. Index cards shall be typewritten and inserted in a durable binder. Attach the keys to the two sets of numbered tags supplied with the cabinet. (The permanent tag and the loan key tag). Instruct the owner in proper use of the system. Install cabinet as directed by the Resident Engineer.

2.15 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, armor and mop plates shall be minimum 1.58 mm (0.062 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.
5. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick plate in place of armor plate. Size of stretcher plate and kick plate shall be 254 mm (10 inches) high.
6. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

2.16 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.
- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.17 FLUSH BOLTS (LEVER EXTENSION)

- A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.
- B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.
- C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).
- D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.
- E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.18 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.

2.19 DOOR PULLS

- A. Conform to ANSI A156.6. Pull plate 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Cut plates of door pulls for cylinders, or turn pieces where required.

2.20 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 J300 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.

2.21 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.

2.22 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.

2.23 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.

2.24 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).

2.25 WEATHERSTRIPS (FOR EXTERIOR DOORS)

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m³/s/m).

2.26 MISCELLANEOUS HARDWARE

- A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E76213, conforming to ANSI A156.5. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.
- B. Cylinders for Various Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur, // except as otherwise specified //. Provide cylinders to operate locking devices where specified for following partitions and doors:
 - 1. Folding doors and partitions.
 - 2. Wicket door (in roll-up door assemblies).
 - 3. Slide-up doors.
 - 4. Swing-up doors.
 - 5. Fire-rated access doors-Engineer's key set.
 - 6. Doors from corridor to electromagnetic shielded room.
 - 7. Day gate on vault door.
- C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.27 PADLOCKS FOR VARIOUS DOORS, GATES AND HATCHES

- A. ASTM E883, size 50 mm (2 inch) wide chain; furnish extended shackles as required by job conditions. Provide padlocks, with key cylinders, for each door in following areas as noted.
- B. Key padlocks as follows:
 - 1. Constant Temperature // and // Cold // Rooms in Research Departments: Research Laboratory Set.
 - 2. Cold Room in Morgue Department: Autopsy Set.
 - 3. Refrigerators in Canteen Department: Canteen Storage Set.
 - 4. All Refrigerator Rooms in Main Kitchen Department: Kitchen Storage Set.
 - 5. Chain Link Fence Gates for Electrical Substation and other Fenced Buildings or Areas: Engineer's set, except as otherwise specified.
 - 6. Chain Link Fence Gates for Oxygen Storage Buildings: Maintenance supply set.
 - 7. Roof Access and Scuttles: Engineer's set.
 - 8. Hinged Wicket in Post Office Partitions: Post Office set.
- C. Omit padlocks on communicating refrigerator doors.

2.28 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS

- A. Where lock is shown, equip each cabinet door (metal) with lock Type E06213, conforming to ANSI A156.5. Key locks in Key Sets approved by Contracting Officer. See mechanical drawings and specifications for location of cabinets.
- B. Cabinet manufacturer shall supply the hinges, bolts and pulls. Ship locks to cabinet manufacturer for installation.

2.29 HINGED WIRE GUARDS (FOR WINDOWS, DOORS AND TRANSOMS) AND WIRE PARTITION DOORS

- A. Butt hinges, type A8133 (special swaging) 100 mm by 90 mm (4 inches by 3-1/2 inches), Finish US2C.
 - 1. 3 hinges for guards over 1060 mm (3-1/2 feet) high.
 - 2. 2 hinges for guards less than 1060 mm (3-1/2 feet) high.
- B. Conform to ANSI A156.5. Lock Type E06081 for guards and Type E06061 for partitions.
 - 1. Keying: Except as noted otherwise, key locks like entrance door or space wherein guards and partitions are located except as otherwise specified.
 - 2. Key locks for partitions enclosing mechanical and electrical equipment in Engineer's Set.
(See detailed drawings for number of locks and butt hinges required for each guard).

2.30 FINISHES

- A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes."
- B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.
- C. Miscellaneous Finishes:
 - 1. Hinges --exterior doors: 630.
 - 2. Hinges --interior doors: 652 or 630 (where noted).
 - 3. Pivots: Match door trim: 626.
 - 4. Door Closers: Factory applied paint finish 689.
 - 5. Thresholds: Mill finish aluminum.
 - 6. Cover plates for floor hinges and pivots: 630.
 - 7. Other primed steel hardware: 600.
- D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces // except where otherwise specified. //
- E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

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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
689	Alum Painted

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 Resident Engineer 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. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

- A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.
- B. Hinge Size Requirements:

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

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- 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 Resident Engineer. 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 Resident Engineer 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 Resident Engineer for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

- A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:
1. Re-adjust hardware.
 2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
 3. Identify items that have deteriorated or failed.
 4. Submit written report identifying problems.

3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

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3.5 HARDWARE SETS

- A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

ELECTRIC HARDWARE ABBREVIATIONS LEGEND:

ADO = Automatic Door Operator

EMCH = Electro-Mechanical Closer-Holder

MHO = Magnetic Hold-Open (wall- or floor-mounted)

INTERIOR SINGLE DOORS

HW-1

Each Door to Have:

	Butt Hinges	A8111 Quantity As required
1	Exit Device	Type 1 x 14 Mod (Non Locking Lever)
1	Closer	C02011/C02021
1	Kick/Armor Plate	J102/J101
1	Mop Plate	J103
1	Set Self-Adhesive Seals	R0E154
1	Wall Stop	L02101
1	Sweep	Pemko 90100CNB (or equal)

HW-2

Each Door to Have:

	Butt Hinges	A8111 Quantity As required
1	Exit Device	Type 1 x 14 Mod (Non Locking Lever)
1	Kick/Armor Plate	J102/J101
1	Mop Plate	J103
1	Closer/Mag. Holder	C00231 (EMCH)
1	Set Self-Adhesive Seals	R0E154
1	Wall Stop	L02101

Interface with Building Fire Alarm System

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HW-3

Each Door to Have:

	Butt Hinges	A8111 Quantity As required
2	Exit Devices	Type 2 x 14 Mod (Non Locking Lever) x LBR
2	Closer/Mag. Holders	C00191 (EMCH)
1	Set Self-Adhesive Seals	R0E154
2	Overhead Stops	
2	Armor Plates	J101
2	Mop Plates	J103
2	Edge Guards	36" High x Prep for Hinges
1	Set Split Astragals	

HW-4

Each Door to Have:

	Butt Hinges	A8111 Quantity As required
2	Exit Devices	Type 2 x 01 x LBR
2	Closer/Mag. Holders	C00231 (EMCH)
2	Kick/Armor Plates	J102/J101
1	Mop Plates	J103
1	Set Self-Adhesive Seals	R0E154
2	Stops	L02101
1	Set Split Astragals	

HW-5

Each Door to Have:

	Hinges	Quantity and Type as Required
1	Storeroom Lockset	F07 x Tactile Outside
1	Closer	C02021 Cush
1	Kick/Armor Plate	J102/J101
1	Mop Plate	J103
1	Set Self-Adhesive Seals	R0E154

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HW-6

Each Door to Have:

	Butt Hinges	A8111 Quantity As required
1	Exit Devices	Type 2 x 08 x LBR
1	Set Self Latching Flush Bolts	Type 27
1	Closer	Active leaf x C02021
1	Set Self-Adhesive Seals	R0E154
2	Stops	L02101
2	Kick Plates	J102
2	Mop Plates	J103
1	Set Split Astragals	

HW-7

Each Door to Have:

	Hinges	Quantity and Type As required
1	Classroom Lockset	F05
1	Stop	L02101
1	Kick/Armor Plate	J102/J101
1	Mop Plate	J103
1	Set Self-Adhesive Seals	R0E154

HW-8

Each Door to Have:

	Hinges	A8111 Quantity As required
1	Passage Set	F01
1	Closer	C02011/C02021
1	Kick/Armor Plate	J102/J101
1	Mop Plate	J103
1	Stop	L02101
1	Set Self-Adhesive Seals	R0E154

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HW-8a

Each Door to Have:

Hinges	A8111 Quantity As required
1 Passage Set	F01
1 Kick Plate	J102
1 Mop Plate	J103
1 Stop	L02101
1 Set Self-Adhesive Seals	R0E154
Reuse Existing ADO	

HW-9

Each Door to Have:

Hinges	Quantity and Type As required
1 Storeroom Lockset	F07
1 Closer	C02011/C02021
1 Kick/Armor Plate	J102/J101
1 Mop Plate	J103
1 Stop	L02101
1 Set Self-Adhesive Seals	R0E154

HW-10

Each Door to Have:

Hinges	A8111 Quantity As required
1 Office Lockset	F04
1 Closer	C02011/C02021
1 Kick/Armor Plate	J102/J101
1 Mop Plate	J103
1 Set Self-Adhesive Seals	R0E154

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HW-11

Each Door to Have:

Butt Hinges	A8111 Quantity As required
2 Exit Devices	Type 2 x 01 x LBR
2 Closer/Mag. Holders	C00231 (EMCH)
2 Kick/Armor Plates	J102/J101
1 Mop Plates	J103
1 Set Self-Adhesive Seals	R0E154
2 Stops	L02101
1 Set Split Astragals	
1 Magnetic Lock Assembly	Equal to DynaLock 3101B-VOP-FAC (Fire Alarm Interface required)

--- E N D ---

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies glass, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

- 1. Doors and Frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, INTERIOR WOOD DOORS.
- 2. Seismic criteria: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

1.3 LABELS

A. Temporary labels:

- 1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
- 2. Temporary labels shall remain intact until glass is approved by Resident Engineer.

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.

1.4 PERFORMANCE REQUIREMENTS

A. Glass Thickness:

- 1. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
- 2. Test in accordance with ASTM E 1300.
- 3. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers and performance requirements.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

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B. Manufacturer's Literature and Data:

1. Glass, each kind required.
2. Fire-rated glass, each kind required.
3. Elastic compound for metal sash glazing.
4. Putty, for wood sash glazing.
5. Glazing cushion.
6. Sealing compound.

C. Samples:

1. Size: Minimum 300 mm by 300 mm (12 inches by 12 inches).
2. Fire-rated Glass

D. 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.

E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American National Standards Institute (ANSI):

Z97.1-04..... Safety Glazing Material Used in Building - Safety Performance
Specifications and Methods of Test.

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

C542-05 Lock-Strip Gaskets.

- C716-06 Installing Lock-Strip Gaskets and Infill Glazing Materials.
C864-05 Dense Elastomeric Compression Seal Gaskets, Setting Blocks,
and Spacers.
C920-11 Elastomeric Joint Sealants.
C1036-06 Flat Glass.
C1048-04 Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated
Glass.
E84-10b Surface Burning Characteristics of Building Materials.
E1300-09a Determining Load Resistance of Glass in Buildings.

D. Code of Federal Regulations (CFR):

1. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 1977, with 1984
Revision.

E. National Fire Protection Association (NFPA):

- 80-10 Fire Doors and Windows.

F. Safety Glazing Certification Council (SGCC):

1. Certified Products Directory (Issued Semi-Annually).

G. Glass Association of North America (GANA):

- Glazing Manual (Latest Edition)
Sealant Manual (2008)

H. American Society of Civil Engineers (ASCE):

- ASCE 7-05 Seismic Provisions

PART 2 - PRODUCTS

2.1 GLASS

- A. Use thickness stated unless specified otherwise in assemblies or required to comply with
specified performance requirements.
- B. Clear Glass:
1. ASTM C1036, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch).

2.2 HEAT-TREATED GLASS

- A. Clear Tempered Glass UCFT (Type MG-1):
 - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
 - 2. Thickness, 6 mm (1/4 inch).

2.3 FIRE RESISTANT GLASS WITHOUT WIRE MESH

- A. Fire resistant glass or glass assembly classified by UL in Building Materials Directory or other approved testing laboratory bearing permanent mark of classification.
- B. Laminated Ceramic Glazing Material (Type FG-1): Category II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a transparent laminated lite of 5/16-inch (8-mm) nominal thickness; unpolished or polished, and as follows:
 - 1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.4 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).
 - 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. Coiled 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. Glazing Gaskets: ASTM C864:
 - 1. Firm dense wedge shape for locking in sash.

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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.
- F. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.
- G. 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.
- H. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.
1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
 2. Designed for dry glazing.
- I. Color:
1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be non-staining.
 2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black or gray.

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 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.

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. Fire Resistant Glass:
 - 1. Glaze in accordance with UL design requirements.

3.4 INSTALLATION - WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 5 mm (3/16 inch) below sight line. Seal corners by butting tape and dabbing with butyl sealant.
- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
- F. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line.
- G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.
- E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
- F. Trim protruding tape edge.

3.6 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.7 PROTECTION

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

--- E N D ---

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SECTION 09 06 00
SCHEDULE FOR FINISHES

SECTION 09 06 00-SCHEDULE FOR FINISHES

VAMC: Providence, Rhode Island
Location: Building 1
Project no. and Name: FAC- Corridor and Lobbies Renovation
Submission: Construction Documents
Date: 12 August 2011

SCHEDULE FOR FINISHES
ISSUED FOR CONSTRUCTION DOCUMENTS

09 06 00-1
08/12/11

**SECTION 09 06 00
SCHEDULE FOR FINISHES**

PART 1 – GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES-provide quadruplicate samples for color approval of materials and finishes specified in this section.

1. COLOR SLIDES-INTERIOR VIEWS: In addition to views required under other sections, provide 20 final construction views showing interior finishes. Comply with requirements under Article 'Photographic Documentation' in Section 01 00 00 GENERAL REQUIREMENTS.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. MASTER PAINTING INSTITUTE: (MPI)
2010Architectural Painting Specification Manual

PART 2 - PRODUCTS

2.1 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

A. SECTION 06 20 00, FINISH CARPENTRY

1. WOOD HANDRAILS AND WALL GUARDS			
Room No. and Name	Finish	Stain	
Wood Crash Rails / Hand Rails (High-mount)	Red Oak/Clear	Light Stain to Match Existing	
Wood Crash Rails (Low-mount)	Red Oak/Clear	Light Stain to Match Existing	
Wood Chair Rails	Red Oak/Clear	Light Stain to Match Existing	

2.2 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. SECTION 07 95 13, EXPANSION JOINT COVER ASSEMBLIES

	Material	Finish	Manufacturer	Mfg. Color Name/No.
Interior Floor Expansion Joint	Aluminum	Mill or clear anodized	C/S Group	Seal color as selected from manufacturer's full range. Finish floor inlay to match finish floor adjacent to joint.
Interior Wall Expansion Joint	Aluminum	Mill or clear anodized	C/S Group	Seal color as selected from manufacturer's full range
Interior Ceiling Expansion Joint	Aluminum	Mill or clear anodized	C/S Group	Seal color as selected from manufacturer's full range

2.3 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door		
Component	Color of Paint Type and Gloss	
Frame (New and existing)	Paint to match adjacent construction	
Window frame (New and existing)	Paint to match adjacent construction	

B. SECTION 08 14 00, INTERIOR WOOD DOORS

Component	Finish/Color
Doors	Maple/Clear

2.4 DIVISION 09 - FINISHES

A. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
Type AT-1	CEILING PANELS AND GRID	2' x 2'	ARMSTRONG	OPTIMA 3152
Type AT-2	CEILING PANELS AND GRID	2' x 2'	ARMSTRONG	ULTIMA 1910
Type AT-3	CEILING PANELS AND GRID (WASHABLE)	2' x 2'	ARMSTRONG	CERAMAGUARD 607
Type AT-4	NEW CEILING PANELS ONLY (EXISTING GRID)	2' x 4'	ARMSTRONG	ULTIMA 1913

B. SECTION 09 65 13, RESILIENT BASE

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
WB-1	6" Rubber Base	Grey	Johnsonite	32 – Pebble
WB-2	6" Rubber Base	Light Blue	Johnsonite	270 – Skydive
WB-3	6" Rubber Base	Green	Johnsonite	271 – Seedling

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C. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
RF-1	13" X 13"	LINOLEUM TILE	Forbo	MCT-3050 WHITE BIRCH
RF-2	13" X 13"	LINOLEUM TILE	Forbo	MCT-810 FLAX
RF-3	13" X 13"	LINOLEUM TILE	Forbo	MCT-3222 JADE
RF-4	13" X 13"	LINOLEUM TILE	Forbo	MCT-767 RUST
RF-5	13" X 13"	LINOLEUM TILE	Forbo	MCT-3030 BLUE
RF-6	13" X 13"	LINOLEUM TILE	Forbo	MCT-795 BUTTER
RF-7	13" X 13"	LINOLEUM TILE	Forbo	MCT-3127 BLEECKERSTREET
RF-8	13" X 13"	LINOLEUM TILE	Forbo	MCT-621 DOVE GREY
RF-9	13" X 13"	LINOLEUM TILE	Forbo	MCT-TOBACCO LEAF

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D. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

		Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and	max 10 units
Gloss Level 2	a high side sheen flat-"a velvet-like"	max 10 units, and	finish 10-35 units
Gloss Level 3	a traditional "egg-shell like" finish	10-25 units, and	10-35 units
Gloss Level 4	a "satin-like" finish	20-35 units, and	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	
Gloss Level 6	a traditional gloss	70-85 units	
Gloss level 7	a high gloss	more than 85 units	

Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1	3	Sherwin Williams	White (SW6385 Dove White)
P-2	3	Sherwin Williams	Light Blue (SW6512 Balmy)
P-3	3	Sherwin Williams	Dark Blue (SW6230 Rainstorm)
P-4	3	Sherwin Williams	Blue (SW6228 Refuge)
P-5	3	Sherwin Williams	Red (SW7582 Salute)
P-6	3	Sherwin Williams	Green (SW 6431)

2.5 DIVISION 10 - SPECIALTIES

A. SECTION 10 11 23 TACKBOARDS

Room No. and Name	Component	Material	Manufacturer	Mfg. Color Name/No.
		Plastic-Impregnated Cork	Forbo	2166 Lt. Brown

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B. SECTION 10 22 26.13, ACCORDION FOLDING PARTITIONS

Location	Component	Finish	Manufacturer	Manufacturer Color Name/No.
	Class-A Heavy Duty Vinyl	Light Blue (Harbonweave II – Breakwater) 299(H)	Modernfold	Modernfold 800M

C. SECTION 10 26 00, WALL GUARDS AND CORNER GUARDS

Item	Material	Manufacturer	Mfg. Color Name/No.
Corner Guards	Stainless Steel		Satin #4
Crash Rail (Bumper Rail)	Stainless Steel		Satin #4

2.6 DIVISION 12- FURNISHINGS

A. SECTION 12 24 00, WINDOW SHADES

Component	Material	Manufacturer	Mfg. Color Name/No.
Shade Band (1% open)	Thermoplastic Olefin (TPO)	MechoShade Systems, Inc.	EcoVeil-0950 Eggshell 0966
Shade Band (5% open)	Thermoplastic Olefin (TPO)	MechoShade Systems, Inc.	EcoVeil-1350 Eggshell 1366
Shade Band (Opaque)	PVC-Free Fiberglass	MechoShade Systems, Inc.	Equinox 0100
Pockets	Color-Coated Metal	MechoShade Systems, Inc.	White

2.7 DIVISION 22 - PLUMBING

A. SECTION 22 40 00, PLUMBING FIXTURES AND TRIM

Item	Color
Drinking Fountain	Stainless Steel

2.8 DIVISION 26 - ELECTRICAL

A. SECTION 26 51 00, BUILDING LIGHTING INTERIOR

Fixture Type	Exterior Finish	Color
F1		
F2		
F3		

PART 3 - EXECUTION

3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Access Flooring	AF
Accordion Folding Partition	AFP
Acoustical Ceiling	AT
Acoustical Ceiling, Special Faced	AT (SP)
Acoustical Metal Pan Ceiling	AMP
Acoustical Wall Panel	AWP
Acoustical Wall Treatment	AWT
Acoustical Wallcovering	AWF
Anodized Aluminum Colored	AAC
Anodized Aluminum Natural Finish	AA
Baked On Enamel	BE
Brick Face	BR
Brick Flooring	BF
Brick Paving	BP
Carpet	CP
Carpet Athletic Flooring	CAF
Carpet Module Tile	CPT
Ceramic Glazed Facing Brick	CGFB
Ceramic Mosaic Tile	FTCT
Concrete	C
Concrete Masonry Unit	CMU
Divider Strips Marble	DS MB
Epoxy Coating	EC
Epoxy Resin Flooring	ERF
Existing	E

Exposed Divider Strips	EXP
Exterior	EXT
Exterior Finish System	EFS
Exterior Paint	EXT-P
Exterior Stain	EXT-ST
Fabric Wallcovering	WF
Facing Tile	SCT
Feature Strips	FS
Floor Mats & Frames	FM
Floor Tile, Mosaic	FT
Fluorocarbon	FC
Folding Panel Partition	FP
Foot Grille	FG
Glass Masonry Unit	GUMU
Glazed Face CMU	GCMU
Glazed Structural Facing Tile	SFTU
Granite	GT
Gypsum Wallboard	GWB
High Glazed Coating	SC
Latex Mastic Flooring	LM
Linear Metal Ceiling	LMC
Linear Wood Ceiling	LWC
Marble	MB
Material	MAT
Mortar	M
Multi-Color Coating	MC
Natural Finish	NF
Paint	P
Paver Tile	PVT
Perforated Metal Facing (Tile or Panels)	PMF
Plaster	PL

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Plaster High Strength	HSPL
Plaster Keene Cement	KC
Plastic Laminate	HPDL
Polypropylene Fabric Wallcovering	PFW
Porcelain Paver Tile	PPT
Quarry Tile	QT
Radiant Ceiling Panel System	RCP
Resinous Flooring	RES
Resilient Stair Tread	RST
Rubber Base	RB
Rubber Tile Flooring	RT
Spandrel Glass	SLG
Stain	ST
Stone Flooring	SF
Structural Clay	SC
Suspension Decorative Grids	SDG

Grids	
Terrazzo Portland Cement	PCT
Terrazzo Tile	TT
Terrazzo, Thin Set	
Textured Gypsum Ceiling Panel	TGC
Textured Metal Ceiling Panel	TMC
Thin set Terrazzo	TST
Veneer Plaster	VP
Vinyl Base	VB
Vinyl Coated Fabric Wallcovering	W
Vinyl Composition Tile	VCT
Vinyl Sheet Flooring	VSF
Vinyl Sheet Flooring (Welded Seams)	WSF
Wall Border	WB
Wood	WD

3.2 EXISTING ROOM FINISHES

- A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

--- E N D---

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel stud wall systems, shaft wall systems, wall furring, fasteners, and accessories for the screw attachment of gypsum board, or other building boards.

1.2 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.3 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 metal stud and furring construction system including details around openings and corner details.
 - 2. Typical shaft wall assembly
 - 3. 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.
- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C754.

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)

A123/A123M-09.....	Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products
A653/A653M-10.....	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
A641/A641M-09a.....	Zinc-Coated (Galvanized) Carbon Steel Wire
C11-10a	Terminology Relating to Gypsum and Related Building Materials and Systems
C645-09a	Non-Structural Steel Framing Members
C754-09a	Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
C841-03(2008)e1.....	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
C1002-07	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
E488-96(2003).....	Strength of Anchors in Concrete and Masonry Elements
E1190-95(2007).....	Strength of Power-Actuated Fasteners Installed in Structural Members

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

2.3 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
 - 1. Use ASTM A653/A653M steel, 0.8 mm (0.0329-inch) thick bare metal (33 mil) for studs.
 - 2. Runners same thickness as studs.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 50.8-mm- (2-inch-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous strap or cold-rolled channel bridging located within 305 mm (12 inches) of the top of studs to provide lateral bracing.
 - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 50.8-mm- (2-inch-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- C. Firestop Tracks (Option for slip-type head joint at fire rated partitions):
 - 1. Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- E. Doubled studs for openings.
- F. Studs 3600 mm (12 feet) or less in length shall be in one piece.
- G. Shaft Wall Framing:
 - 1. Conform to rated wall construction.
 - 2. C-H Studs.
 - 3. E Studs.
 - 4. J Runners.
 - 5. Steel Jamb-Strut.

2.4 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:

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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. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.5 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. 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.

C. 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.

D. 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.

E. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 406 mm (16 inches) on center.

C. Allow for deflection space indicated on Drawings, or where not indicated cut studs 18 mm (3/4 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, sound rated partitions, and where indicated on Drawings.
- F. At existing plaster ceilings, studs may terminate at ceiling.
- G. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
 - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Fastening Studs:
 - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
 - 2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- I. Chase Wall Partitions:
 - 1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 - 2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- J. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.
- K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:
 - 1. Framed with 63 mm (2-1/2 inch) or narrower studs, 406 mm (16 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:
 - 1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.

2. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
 3. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
 4. 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.
 5. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions.
- 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, markerboards, tackboards, handrail brackets, fire extinguisher cabinets, and other items 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 indicated on the 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 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.)

--- E N D ---

**SECTION 09 29 00
GYPSUM BOARD**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

1.3 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, steel beams, or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.
- C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 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. Samples:
 - 1. Cornerbead.
 - 2. Edge trim.
 - 3. Control joints.

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- D. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

- A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

- A. 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):

C11-10a Terminology Relating to Gypsum and Related Building Materials
and Systems

C475-02(2007) Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08 Application and Finishing of Gypsum Board

C919-08 Sealants in Acoustical Applications

C954-10 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

C1047-10a Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177-08 Glass Mat Gypsum Substrate for Use as Sheathing

C1396-09a Gypsum Board

D3273-00 (2005) Standard Test Method for Resistance to Growth of Mold on the
Surface of Interior Coatings in an Environmental Chamber.

E84-10b 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. Moisture and Mold-Resistant Type Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. With moisture- and mold-resistant core and surfaces, and shall attain a disfigurement rating of 10 when tested in accordance with ASTM D 3273.
- B. Moisture and Mold-Resistant Coreboard or Shaft Wall Liner Panels.
 - 1. ASTM C1396, Type X.
 - 2. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with moisture- and mold-resistant core and surfaces, and shall attain a disfigurement rating of 10 when tested in accordance with ASTM D 3273.
- C. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 40 percent by weight.

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. Use fasteners of type and size same as used in fire rating test for assemblies with same number of layers of Type X gypsum board.
- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

- A. General: Provide manufacturer's recommended mold and moisture resistant materials and formulations suitable for finishing application.

- B. 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 on Drawings.
 - e. Corridor partitions.
 - 2. One side of partitions or furring:
 - a. Inside of exterior wall furring or stud construction.
 - b. Room side of room without suspended ceilings.
 - c. Furring for pipes and duct shafts, except where fire rated 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. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- D. Bring gypsum board into contact, but do not force into place.
- E. Ceilings:
 - 1. For single-ply construction, use perpendicular application.
- F. Walls (Except Shaft Walls):

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1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 9000 mm (30 feet).
 - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

G. 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.

H. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board.

I. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.

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- 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 CAVITY SHAFT WALL

- A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
- B. Conform to UL Designs as indicated on Drawings. At existing walls, conform to UL design of existing wall.
- C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
 - 1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
 - 2. Stagger joints top and bottom in adjacent panels.
 - 3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
- D. Gypsum Board:
 - 1. Two hour wall:
 - a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.
 - b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.
 - c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
 - 2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.
 - 3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.
- E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

3.4 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 5 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:

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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 gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and sound rated construction. Sanding is not required of non decorated surfaces.

3.5 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 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:
- B. Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Seismic criteria: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

1.3 SUBMITTALS

- 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, including suspension system specified to match existing.
 - 2. Acoustical units, each type
- D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.
- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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-09a.....	Zinc-coated (Galvanized) Carbon Steel Wire
A653/A653M-10.....	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
B633-07	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
C423-09a.....	Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
C634-02 (E2007)	Standard Terminology Relating to Environmental Acoustics
C635/C635M-07	Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
C636/C636M-08	Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
E84-10b	Surface Burning Characteristics of Building Materials
E119-11	Fire Tests of Building Construction and Materials
E413-10	Classification for Rating Sound Insulation.
E488-96(2003).....	Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
E580/E580M-11a.....	Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
E1264-08e1	Classification for Acoustical Ceiling Products
E1512-01(2007)	Standard Test Methods for Testing Bond Performance of Bonded Anchors

- C. American Society of Civil Engineers, Structural Engineering Institute(ASCE/SEI):

ASCE/SEI 7-2005.....	Minimum Design Loads for Buildings and Other Structures.
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- D. Ceilings and Interior Systems Construction Association (CISCA):

CISCA Zones 0-2	Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings—Seismic Zones 0-2
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PART 2 - PRODUCTS

2.1 GENERAL

- A. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
 - 2. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

2.2 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.
 - b. Extruded aluminum.
 - 2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.
 - 3. Use aluminum suspension systems where indicated.
- 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.

2.3 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.

2.4 WIRE

- A. ASTM A641.

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- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.5 ANCHORS AND INSERTS

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Post-installed expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
- B. 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 support five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Tile Splines: ASTM C635.
- D. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
 - 1. At Contractor's option, in lieu of seismic stabilizer bars, provide manufacturer's standard clip system complying with indicated seismic criteria where compatible with suspension system.

2.6 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 Kg Pound	Hot-rolled Kg Pound
38	1 1/2	4 475	08 1120
50	2	6 590	71.5 1260

2.7 ACOUSTICAL UNITS

A. General:

1. Ceiling panels shall meet minimum 37 percent bio-based content in accordance with USDA Bio-Preferred Product requirements.
2. ASTM E1264, weighing 3.6 kg/m² (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): Minimum 33 unless specified otherwise: ASTM E413.
6. Manufacturer's standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces, except as specified otherwise
7. Lay-in panels: Sizes (610 by 610 mm) 24 by 24 inches unless indicated otherwise, with square edges.

B. Acoustical Ceiling Panels AT-1

1. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type XII, glass-fiber base with membrane-faced overlay; Form 2, cloth.
 - b. Pattern: E (lightly textured).
2. Color: White.
3. LR: Not less than 0.85.
4. NRC: Not less than 0.90.
5. AC: Not less than 190.
6. Edge/Joint Detail: Square.
7. Thickness: Minimum 25 mm (1 inch).
8. Modular Size: 610 by 610 mm (24 by 24 inches) unless indicated otherwise.
 - a. Size of (1220 by 1220 mm) 48 by 48 inches where indicated on Drawings.
9. Suspension Grid Type: Galvanized steel.
10. Anti-microbial: Anti-microbial treatment for resistance against growth of mold and mildew and gram-positive and gram-negative odor and stain causing bacteria.
11. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of pre consumer recycled content constitutes a minimum percentage by weight of 30 percent.

C. Acoustical Ceiling Panels AT-2

1. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted.
 - b. Pattern: E (lightly textured).
2. Color: White.
3. LR: Not less than 0.85.

4. NRC: Not less than 0.70.
5. CAC: Not less than 33.
6. Edge/Joint Detail: Square.
7. Thickness: Minimum 16 mm (5/8 inch).
8. Modular Size: 610 by 610 mm (24 by 24 inches) unless indicated otherwise.
9. Suspension Grid Type: Galvanized steel.
10. Anti-microbial: Anti-microbial treatment for resistance against growth of mold and mildew and gram-positive and gram-negative odor and stain causing bacteria.
11. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of pre consumer recycled content constitutes a minimum percentage by weight of 35 percent.

D. Acoustical Ceiling Panels AT-3

1. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type: Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.
 - b. Pattern: CE (perforated, small holes and lightly textured) or CEG.
2. Color: White.
3. LR: Not less than 0.80.
4. NRC: Not less than 0.50.
5. CAC: Not less than 20.
6. Edge/Joint Detail: Square.
7. Thickness: Minimum 15 mm (5/8 inch).
8. Modular Size: 610 by 610 mm (24 by 24 inches) unless indicated otherwise.
9. Suspension Grid Type: Aluminum.
10. Anti-microbial: Anti-microbial treatment for resistance against growth of mold and mildew and gram-positive and gram-negative odor and stain causing bacteria.
11. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of pre consumer recycled content constitutes a minimum percentage by weight of 15 percent.

E. Acoustical Ceiling Panels AT-4: Same as AT-2 except for the following:

1. Modular Size: 610 by 1220 mm (24 by 48 inches) unless indicated otherwise.
2. Suspension Grid Type: Existing grid to remain. Verify compatibility of panels with existing grid.

2.8 ACCESS IDENTIFICATION

A. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.

B. Use markers of the same diameter throughout building.

C. Color Code: Use following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green.....	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water
Orange.....	Ductwork: Fire Dampers
Blue.....	Ductwork: Dampers and Controls
Black.....	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 CEILING TREATMENT

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.
- B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.
- C. Moldings:
 - 1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
 - 2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
- D. Perimeter Seal:
 - 1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
 - 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.
- 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.
- F. New ceiling panels installed within existing grid:
 - 1. Repair or replace damaged portions of existing grid that are not suitable for support.
 - 2. Touch-up exposed portions of existing grid with damaged factory-finish.
 - 3. Clean existing grid prior to installation of ceiling panels.

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 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook.", except as specified otherwise with more stringent requirements.
2. Use direct hung suspension system as defined in ASTM C635.
3. Support a maximum area of 1.48 m² (16 sf) of ceiling per hanger.
4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.
7. Use main runners not less than 1200 mm (48 inches) in length.
8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:

1. Concrete:

- a. Use post-installed expansion anchors, eye pins, or threaded studs with screw-on eyes in existing concrete structures to support hanger and bracing 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. Seismic Ceiling Bracing System:

1. Construct system in accordance with ASTM E580 and CISC's "Ceiling Systems Handbook" for CISC Zone 2 (ASCE 7 Seismic Design Category C).
2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

3.3 ACOUSTICAL UNIT INSTALLATION

- A.** Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
- B.** Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
1. Install tile to lay level and in full contact with exposed grid.
 2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.
- C.** Install lay-in acoustic panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels with pattern running in one direction throughout building.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
- D. 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.

3.4 CLEAN-UP AND COMPLETION

- A.** Replace damaged, discolored, dirty, cracked and broken acoustical units.
- B.** Leave finished work free from defects.

--- E N D ---

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the installation of rubber base.

1.2 RELATED WORK

- A. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Base manufacturer's recommendations for adhesives.
 - 3. Application and installation instructions.
- C. Samples:
 - 1. Base: 150 mm (6 inches) long, each type and color.
- D. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Include mockups of resilient base where specified to be included with flooring mockups in other specification sections.

1.5 DELIVERY

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

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- B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.6 STORAGE

- A. Store materials in weather tight and dry storage facility.
- B. Protect material from damage by handling and construction operations before, during, and after installation.
- C. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 10 deg C (50 deg F) or more than 32 deg C (90 deg F).

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 21 deg C (70 deg F) or more than 35 deg C (95 deg F), in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 13 deg C (55 deg F) or more than 35 deg C (95 deg F).
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.8 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. Code of Federal Regulations (CFR):
40 CFR 59, Subpart DNational Volatile Organic Compound Emission Standards for
Architectural Coatings

PART 2 - PRODUCTS

2.1 GENERAL

- A. Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

- A. ASTM F1861, 3 mm (1/8 inch) thick, 150 mm (6 inches) high, Type TP Rubber, Thermoplastics, Group 2-layered with molded top. Style B-cove unless indicated otherwise.
- B. Lengths: Coils in manufacturer's standard length.

2.3 ADHESIVES

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Use low-VOC water-based adhesive during installation..
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.

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 Resident Engineer.
- B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.
- C. The Resident Engineer 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. Sand or cut away protrusions.
- 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 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, lockers, fixed equipment, built-in furniture, island cabinets and where other built-in equipment and items occur.
 - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - 2. Set base with joints aligned and butted to touch for entire height.
 - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
 - a. Short pieces to save material will not be permitted.
 - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
 - 1. Score back of outside corner.
 - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

3.5 CLEANING AND PROTECTION

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

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- B. Clean and polish materials in the following order:
 - 1. After two weeks, scrub resilient base 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.
- C. 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.

--- E N D ---

SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the installation of linoleum tile flooring and accessories.

1.2 RELATED WORK

- A. Color and pattern: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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 manufacturer's recommendations for adhesives, underlayment, primers and polish.
 - 3. Application and installation instructions.
- C. Samples:
 - 1. Tile: Full size for each type, pattern and color.
 - 2. Edge Strips: 150 mm (6 inches) long, each type.
- D. Shop Drawings:
 - 1. Layout of patterns shown on the drawings and in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Edge strip locations showing types and detail cross sections.
- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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.

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- 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
 - E648-10e1.....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(2008).....Determining Floor Flatness and Floor Levelness Numbers
 - F710-08.....Preparing Concrete Floors to Receive Resilient Flooring
 - F1869-10.....Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - F2195-07.....Linoleum Floor Tile
- C. Code of Federal Regulations (CFR):
 - 40 CFR 59, Subpart D.....National Volatile Organic Compound Emission Standards for Architectural Coatings

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 LINOLEUM TILE

- A. Floor Tile: ASTM F 2195, Type I, linoleum floor tile with fibrous backing.
 - 1. Nominal Floor Tile Size: 13 by 13 inches (330 by 330 mm).
- B. Seaming Method: Standard.
- C. Thickness: 0.080 inch (2.0 mm).

2.3 ADHESIVES

- A. Comply with applicable regulations regarding toxic and hazardous materials Green Seal (GS-36) for commercial adhesive.
- B. Use low-VOC adhesive during installation..
 - 1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Linoleum Adhesives: Not more than 50 g/L.

2.4 PRIMER (FOR CONCRETE SUBFLOORS)

- A. As recommended by the adhesive and tile manufacturer.

2.5 LEVELING COMPOUND (For Concrete Floors)

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.
- B. Determine the type of underlayment selected for use by the condition to be corrected.

2.6 POLISH AND CLEANERS

- A. Cleaners RFCI CL-1.
- B. Polish: ASTM D4078.

2.7 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. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl.

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:
 - 1. 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:
- F. Determine Adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MRP.
- G. Moisture Testing: Perform moisture and pH test as recommended by the flooring and adhesive manufacturers. Perform test locations starting on the deepest part of the concrete structure. Proceed with installation only after concrete substrates meet or exceed the manufacturer's requirements. In the absence of specific guidance from the flooring or adhesive manufacturer the following requirements are to be met:
 - 1. Perform moisture vapor emission tests in accordance with ASTM F1869. Proceed with installation only after substrates have a maximum moisture-vapor-emission rate of 1.36 kg of water/92.9 sq. m (3lb of water/1000 sq. ft.) in 24 hours.
 - 2. Perform concrete internal relative humidity testing using situ probes in accordance with ASTM F2170. Proceed with installation only after concrete reaches maximum 75 percent relative humidity level measurement.
- H. Perform additional subfloor preparation to obtain satisfactory adherence of flooring if subfloor test patches allows easy removal of tile.

- I. 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.
- J. 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 Resident Engineer may have test tiles removed to check for non-uniform adhesion, spotty adhesive coverage, and ease of removal. Install new tile for broken removed tile.
- F. Installation of Edge Strips:
 - 1. Locate edge strips under center line of doors unless otherwise shown.
 - 2. Set resilient edge strips in adhesive.
 - 3. Where tile edge is exposed, butt edge strip to touch along tile edge.
 - 4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
- B. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- C. Keep traffic off resilient material for a minimum 72 hours after installation.

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- D. Clean and polish materials in the following order:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. For the first two weeks sweep and vacuum only.
 - 3. After two weeks, wash and scrub resilient materials with a minimum amount of water and a mild detergent. Leave surface clean and free of detergent residue.
 - 4. Damp-mop surfaces to remove marks and soil.
 - 5. Apply polish to the floors in accordance with the flooring manufacturer's instructions.
- E. When construction traffic occurs over tile, after allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Resident Engineer. 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 Resident Engineer.
- F. When protective materials are removed and immediately prior to acceptance, replace any damaged tile, re-clean resilient materials, lightly re-apply polish and buff floors.

3.5 LOCATION

- A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework and other built-in equipment occurs, except where mounted in wall recesses.
- B. Extend tile flooring for room into adjacent closets and alcoves.

--- 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 coatings specified, and striping or markers and identity markings.

1.2 RELATED WORK

- A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 26 - ELECTRICAL
- B. Prefinished millwork: Section 06 20 00 FINISH CARPENTRY.
- C. Prefinished flush doors with transparent finishes: Section 08 14 00, INTERIOR WOOD DOORS.
- D. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
- C. 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.
- D. 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. Attach labels to panel stating the following:
 - a. Federal Specification Number or manufacturers name and product number of paints used.
 - b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 - c. Product type and color.
 - d. Name of project.
4. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- E. Sample of identity markers if used.
- F. Manufacturers' Certificates indicating compliance with specified requirements:
 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
- G. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
 1. Name of manufacturer.
 2. Product type.
 3. Batch number.
 4. Instructions for use.
 5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
 1. Federal Specification Number, where applicable, and name of material.
 2. Surface upon which material is to be applied.
 3. If paint or other coating, state coat types; prime, body or finish.
- C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

1.5 MOCK-UP PANEL

- A. Before starting application of paint mixtures, apply paint of each type and color as specified to an area, not to exceed 9 m² (100 ft²), selected by Resident Engineer.
- B. Finish and texture approved by Resident Engineer 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-2008 Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
 - ACGIH TLV-DOC-2008 Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. American National Standards Institute (ANSI):
 - A13.1-07 Scheme for the Identification of Piping Systems
- D. 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)
- F. Master Painters Institute (MPI):
 - No. 1-10.....Aluminum Paint (AP)
 - No. 9-10..... Exterior Alkyd Enamel MPI Gloss Level 6 (EO)
 - No. 18-10.....Organic Zinc Rich Primer
 - No. 22-10.....Aluminum Paint, High Heat (up to 590° - 1100F) (HR)
 - No. 107-10..... Rust-Inhibitive Primer (Water Based)
 - No. 134-10..... Waterborne Galvanized Primer
 - No. 144-10..... Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 2
(LF)
 - No. 145-10..... Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 3
(LL)
 - No. 147-10..... Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 5
(SG)
 - No. 149-10.....Primer Sealer, Interior Institutional Low Odor/VOC
- G. The Society for Protective Coatings (SSPC):

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SSPC SP 1-04 (R2004)..... Solvent Cleaning
SSPC SP 2-04 (R2004)..... Hand Tool Cleaning
SSPC SP 3-04 (R2004)..... Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plastic Tape:

1. Pigmented vinyl plastic film in colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES or specified.
2. Pressure sensitive adhesive back.
3. Widths as shown.

B. Identity markers options:

1. Pressure sensitive vinyl markers.
2. Snap-on coil plastic markers.

C. Aluminum Paint (AP): MPI 1.

D. Exterior Alkyd Enamel (EO): MPI 9.

E. Organic Zinc rich Coating: MPI 18.

F. High Heat Resistant Coating (HR): MPI 22.

G. Rust-Inhibitive Primer (Water Based): MPI 107.

H. Waterborne Galvanized Primer: MPI 134.

I. Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 2 (LF): MPI 144.

J. Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 3 (LL): MPI 145.

K. Latex, Interior Institutional Low Odor/VOC, MPI Gloss Level 5 (SG): MPI 147.

L. Primer Sealer, Interior Institutional Low Odor/VOC: MPI 149.

2.2 PAINT PROPERTIES

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE

- A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
 - 1. Volatile Organic Compounds (VOC): VOC content of paint materials shall not exceed 11g/L for interior latex paints/primers.
 - 2. Lead-Based Paint:
 - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
 - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
 - 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.
 - 7. VOC content for solvent-based paints shall not exceed 250g/l and shall not be formulated with more than one percent aromatic hydro carbons by weight.

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 not paint in direct sunlight or on surfaces that the sun will soon warm.
 - 4. Apply only on clean, dry and frost free surfaces except as follows:

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- a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
- b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.

3.2 SURFACE PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" and "MPI Maintenance Repainting Manual" applicable to substrates indicated.
- B. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.
- C. 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.
- D. Ferrous Metals:
 1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
 2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
 - a. This includes flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
 4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
 5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.
- E. Zinc-Coated (Galvanized) Metal, Surfaces Specified Painted:
 1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).

2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer).

F. 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 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 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. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
- B. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- C. 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.
- D. Apply each coat evenly and cover substrate completely.
- E. Allow not less than 48 hours between applications of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
- F. Finish surfaces to show solid even color, free from runs, lumps, brush marks, laps, holidays, or other defects.
- G. Apply by brush, roller or spray, except as otherwise specified.

- H. Do not spray paint in existing occupied spaces unless approved by Resident Engineer, except in spaces sealed from existing occupied spaces.
 - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
 - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizers and other recessed equipment and similar prefinished items.
- I. 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.
- D. Prime rebates for face glazing of steel.
- E. Metals except boilers, incinerator stacks, and engine exhaust pipes:
 - 1. Steel and iron: MPI 107 Rust-Inhibitive Primer (Water Based).
 - 2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer).
 - 3. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel (EO)).
 - 4. Asphalt coated metal: MPI 1 (Aluminum Paint (AP)).
 - 5. Metal over 94 degrees C. (200 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating (HR)).
- F. Gypsum Board:
 - 1. Surfaces scheduled to have MPI 144 (Latex, Interior, Institutional Low Odor/VOC, MPI Gloss Level 2 (LF)).
 - a. Primer: MPI 149 (Primer Sealer, Interior, Institutional Low odor/VOC).

3.6 INTERIOR FINISHES

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
 - 1. 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:

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- a. Apply two coats of MPI 147 (Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss, unless specified otherwise).
- b. Machinery: One coat MPI 9 (Exterior Alkyd Enamel (EO)).
- c. Asphalt Coated Metal: One coat MPI 1 (Aluminum Paint (AP)).
- d. Ferrous Metal over 94 degrees K (200 degrees F): Boilers, Incinerator Stacks, and Engine Exhaust Pipes: One coat MPI 22 (High Heat Resistant Coating (HR)).

C. Gypsum Board:

1. Apply two coats of MPI 144 (Latex, Interior, Institutional Low Odor/VOC, MPI Gloss Level 2 (LF)) unless specified otherwise.

3.7 REFINISHING EXISTING PAINTED SURFACES

- A. Comply with manufacturer's written instructions and recommendations in "MPI Maintenance Repainting Manual" applicable to existing substrates.
- B. Clean, patch and repair existing surfaces as specified under surface preparation.
- C. Remove and reinstall items as specified under surface preparation.
- D. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
- E. 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.
- F. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- H. Sand or dull glossy surfaces prior to painting.
- I. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.8 PAINT COLOR

- A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.
- C. Coat Colors:
 1. Color of priming coat: Lighter than body coat.
 2. Color of body coat: Lighter than finish coat.
 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.9 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 in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified under paragraph H, colors.
- C. Paint various systems specified in Division 26 - ELECTRICAL.
- 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 in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
 2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
 - a. WhiteExterior 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 conduits 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.

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- I. Apply paint systems on properly prepared and primed surface as follows:
 1. Interior Locations:
 - a. Apply Two coats of MPI 144 (Latex, Interior, Institutional Low Odor/VOC, MPI Gloss Level 2 (LF)) 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, electric conduits and panel boards.
 - 3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
 - b. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 94 degrees K (200 degrees F) of following items:
 - 1) Steam line flanges, bare pipe, fittings, valves, hangers and supports over 94 degrees K (200 degrees F).
 - c. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 9 (Exterior Alkyd Enamel (EO)) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.
 2. Other exposed locations:
 - a. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: Two coats of MPI 144 (Latex, Interior, Institutional Low Odor/VOC, MPI Gloss Level 2 (LF)).

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 in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
 3. Painting of ferrous metal and galvanized metal.
 4. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
 1. Prefinished items:
 - a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
 - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
 2. Finished surfaces:
 - a. Hardware except ferrous metal.

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- 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. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
- 10. Face brick.
- 11. Structural steel encased in concrete, masonry, or other enclosure.
- 12. Structural steel to receive sprayed-on fire proofing.
- 13. Ceilings, walls, columns in interstitial spaces.
- 14. Ceilings, walls, and columns in pipe basements.
- 15. Wood Shingles.

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.

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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 BACK- GROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
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

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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
Vent Line	—	Yellow	Black	Vent
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
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

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Chemical Resistant Pipe				
Waste	—	Yellow	Black	Acid Waste
Vent	—	Yellow	Black	Acid Vent
Atmospheric Vent	—	Green	White	ATV
Sliver Recovery		Green	White	Sliver 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, or 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.

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.
3. Locate not more than 6100 mm (20 feet) on center on corridor sides of partitions, and with at least one message per room on room side of partition.
4. Use semi-gloss paint of color that contrasts with color of substrate.

C. Identify columns in 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.

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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.

--- E N D ---

SECTION 10 11 23
TACKBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies tackboards and related items.
- B. Boards may be either factory or field assembled.

1.2 RELATED WORK

- A. Color of trim and tackboard: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 QUALITY ASSURANCE

- A. 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, dimensions, construction, installation, anchorage and relation to adjacent construction. Include plans, elevations, sections, details, and attachments to other work
 - 1. Include sections of typical trim members.
 - 2. Include mounting details.
- C. Manufacturer's Literature and Data:
 - 1. Tackboard.
- D. Samples:
 - 1. Tackboard, 300 by 300 mm (six by six inches), each color, mounted on backing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store tackboards vertically with packing materials between each unit.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install tackboards until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with tackboard surfaces by field measurements before fabrication.

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 Architectural Manufacturers Association (AAMA):
611-98 Voluntary Specification for Anodized Architectural Aluminum
- C. American Society for Testing and Materials (ASTM):
B221-08 Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire,
Shapes and Tubes
E84-10b Standard Test Method for Surface Burning Characteristics of
Building Materials
- D. American National Standards Institute (ANSI):
A208.1-06 Particleboard
A135.4-04 Basic Hardboard

PART 2 - PRODUCTS

2.1 TACKBOARD ASSEMBLIES

- A. Tackboard assemblies shall consist of a tackboard, snap on aluminum frame, grounds and other items specified and shown.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 MATERIALS

- A. Aluminum, extruded: ASTM B221.
- B. Plastic-Impregnated Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.
- C. Backing: Hardboard, AHBA A135.4 tempered or particleboard, ANSI A208.1, Grade M-1.

2.3 TACKBOARD ACCESSORIES

- A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.
 - 1. Field-Applied Trim: Manufacturer's standard, snap-on trim with no visible screws or exposed joints.
 - 2. Factory-Applied Trim: Manufacturer's standard.

2.4 FABRICATION

- A. Plastic-Impregnated-Cork Tackboard: 6-mm- (1/4-inch-) thick, plastic-impregnated cork sheet factory laminated to 6-mm- (1/4-inch-) thick hardboard backing.
 - 1. Colors: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Corners: Square.
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
 - 5. Mounting: Wall.
 - 6. Mounting Height: As indicated on Drawings.
 - 7. Trim Frame: Aluminum.
 - 8. Grounds: Continuous zinc-coated (galvanized) steel or extruded aluminum members designed to support the tackboard and clips for snap-on frames, and map rail
 - 9. Clips: Manufacturer's standard as required to support frame, mullions, and display rail,
- B. Tackboards 3660 mm (12 feet) or less in length shall be in one piece. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints. Larger units shall have one joint at center or in locations as indicated on Shop Drawings. Joints shall have concealed metal spline, with faces in same plane and edges shall touch along entire length.
- C. Tackboards: Factory or field assemble tackboards unless otherwise indicated.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to tackboards at manufacturer's factory before shipment.
- D. Factory-Assembled Tackboard Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for tackboard surfaces. Partitions shall have reinforcing to receive fasteners. Verify type and placement of reinforcement.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of tackboards, including dirt, mold, and mildew.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between tackboard surfaces and wall surfaces.

3.3 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.

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- C. Do not proceed with the installation until reinforcement is in place and surfaces are flat.
- D. Assemble units as specified by the manufacturer.
- E. Install tackboards in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.4 INSTALLATION OF FIELD-FABRICATED TACKBOARDS AND ASSEMBLIES

- A. Field-Assembled Tackboard Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.
 - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
 - 2. Provide manufacturer's standard concealed vertical-joint spline system between abutting sections of tackboards.
 - 3. Field-Applied Aluminum Trim: Attach trim over edges of tackboards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches (610 mm) o.c.

3.5 INSTALLATION OF FACTORY-FABRICATED TACKBOARDS AND ASSEMBLIES

- A. Tackboards: Attach concealed clips, hangers, and grounds to wall surfaces and to tackboards with fasteners at not more than 400 mm (16 inches) o.c. Secure both top and bottom of boards to walls.

3.6 CLEANING AND PROTECTION

- A. Touch up factory-applied finishes to restore damaged or soiled areas.
- B. Cover and protect surfaces after installation and cleaning.

-- E N D --

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior signage for room numbers, directional signs, and code required signs,

1.2 RELATED WORK

- A. Lighted EXIT signs for egress purposes are specified under Division 26, ELECTRICAL.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
 - 1. Include sign location plan, showing location, type and total number of signs required.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.
- B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.
- C. Deliver signs only when the site and mounting services are ready for installation work to proceed.
- D. Store products in dry condition inside enclosed facilities.

1.5 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):
 - B209-07Aluminum and Aluminum-Alloy Sheet and Plate

B221-06Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire,
Shapes, and tubes.

C. Federal Specifications (Fed Spec):

MIL-PRF-8184FPlastic Sheet, Acrylic, Modified.

MIL-P-46144CPlastic Sheet, Polycarbonate

1.6 MINIMUM SIGN REQUIREMENTS

A. Permanent Rooms and Spaces:

1. Tactile and Braille Characters, raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.
2. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed and Helvetica Regular.
3. Character Height: Minimum 16 mm (5/8 in) high, Maximum 50 mm (2 in).
4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.
5. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
6. Mounting Location and Height: As shown. Mounted on wall adjacent to the latch side of the door and to avoid door swing and protruding objects.

B. Overhead Signs:

1. Type Styles: As shown. Characters shall have a width-to-height ratio between 3:5 and 1:1. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
2. Character Height: minimum 75 mm (3 in) high for overhead signs. As shown, for directional signs.
3. Finish and Contrast: Same as for signs of permanent rooms and spaces.
4. Mounting Location and Height: As shown.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Signs complete with lettering, framing and related components for a complete installation.
- B. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- C. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Resident Engineer to be notified of any discrepancy in drawing, in field directions or conditions, and of any changes required for all such construction details.

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- D. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

2.2 MANUFACTURER AND INSTALLER

- A. Contract with the VA Medical Center's standard GSA signage vendor as follows:

- 1. GDS, Inc.

Contact: Lauren Graziano, Project Manager.
33 S. Commercial Street
Manchester, NH 03101
P: 603.669.1300
F: 603.622.1457

2.3 SIGN PRODUCTS

- A. Match existing signs in area of renovations.

2.4 FABRICATION

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.
- C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
- D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
- E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus mm (0.015 inches). Restore texture to filed or cut areas.
- F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.
- H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.

- I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.
- J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
- K. Movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Resident Engineer and forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.
- B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact Resident Engineer for clarification.
- C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.
- D. Remove or correct signs or installation work Resident Engineer determines as unsafe or as an unsafe condition.
- E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.
- F. Locate signs as shown on the Drawings.
- G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.
- H. Contractor shall be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities shall be the sole responsibility of the Contractor to correct and repair.

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--- END ---

SECTION 10 22 26.13
ACCORDION FOLDING PARTITIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes:

1. Manually operated, top-supported, accordion folding partitions.

1.2 RELATED WORK

- A. Color and finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 PERFORMANCE REQUIREMENTS

- A. When partitions are fully extended and latched, they shall provide a complete closure of the opening.

1.4 SUBMITTALS

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

- B. Product Data: For each type of product indicated.

- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
2. Indicate facing-material seam locations, if any.

- D. Samples: For each type of exposed material, facing material, and finish indicated, prepared on Samples of size indicated below:

1. Facing Material: Manufacturer's standard-size unit, not less than 150 mm (6 inches) square.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is a manufacturer regularly engaged in the manufacture of accordion folding partitions similar to specified partitions.

- B. Fire-Test-Response Characteristics: Provide partitions with finishes meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of accordion folding partition openings by field measurements before fabrication.

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):

A1008/A1008M-11.....	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low Alloy with Improved Formability
E84-10b.....	Surface Burning Characteristics of Building Materials
E557-00(2006)e1.....	Installation of Operable Partitions
- C. National Fire Protection Association (NFPA):

286-10	Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
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PART 2 - PRODUCTS

2.1 ACCORDION FOLDING PARTITION

- A. Accordion Folding Partition: Accordion folding frame with pantograph sections designed for horizontal extension and retraction, covered with decorative facing material, reinforced for hardware attachment, supported by overhead suspension system, without tracks or floor guides, and equipped with manufacturer's standard air-release method to prevent billowing.
 1. Factory fabricated, designed to provide stability and uniform spacing of folds during operation.
- B. Partition Type: Single fixed jamb partition with the following hardware:
 1. Lead Post Latching Hardware: Latch on both sides secured to surface jamb striker.
 2. Storage-End Hardware: Same as lead post, secured to surface jamb striker.
- C. Dimensions:

1. Stack Width (Stored): Maximum 318 mm (12-1/2 inches).
 2. Width When Extended: Maximum 178 mm (7 inches).
 3. Total Stack Depth (Stored): Maximum 12 mm per 300 mm (1/2 inch per foot) per 300 mm (1/2 inch per foot) of opening width, plus depth of lead post.
- D. Facing Material: Reinforced heavy-duty vinyl with woven backing.
1. Color/Pattern: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.

2.2 COMPONENTS

- A. Posts and Seals: Provide types of posts and seals that produce accordion folding partitions complying with performance requirements.
1. Posts: Steel or aluminum; formed with deep-nesting and interlocking interfaces and fabricated to ensure rigidity of accordion folding partition.
 2. Perimeter Seals: Manufacturer's standard vinyl, neoprene, or woven silica vertical seals, horizontal top and bottom seals, and closures for lead posts and jams.
- B. Hardware: Manufacturer's standard manually operated pulls and latches as required to operate accordion folding partitions; with decorative, protective finish.
- C. Trim: Manufacturer's standard with decorative, protective finish.
- D. Tiebacks: As required to maintain accordion folding partitions in stacked position; with manufacturer's standard finish.

2.3 SUSPENSION SYSTEMS

- A. Suspension Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for type of operation, size, and weight of accordion folding partition indicated. Size track to support partition operation and storage without damage to suspension system, accordion folding partitions, or adjacent construction. Limit track deflection to no more than 2.54 mm (0.10 inch) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
1. Track: Recessed.
 - a. Head Closure Trim and Track Channel Pocket: For protecting overhead surfaces and enclosing overhead track opening; with factory-applied, decorative, protective finish.
- B. Carriers: Trolley system as required for size and weight of partition and for easy, quiet operation; with four-wheel ball-bearing carriers at lead post and two-wheel ball-bearing carriers at intermediate panel supports.
1. Wheels: Steel with nylon treads.
- C. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

- D. Steel Finish: Factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.4 FACING MATERIALS

- A. General: Provide facing materials with appropriate backing that comply with indicated fire-test-response characteristics, and that are factory attached to accordion folding partitions with concealed fasteners.
 - 1. Factory-apply facing material free of air bubbles, wrinkles, blisters, and other defects; and with no gaps or overlaps. Tightly secure and conceal raw and selvage edges of facing material for finished appearance. Horizontal butted edges or seams are not permitted.
 - 2. Where facing material with directional or repeating pattern, directional weave, or matching grain is indicated, mark facing-material top and attach facing material in same direction.
- B. Vinyl-Coated Fabric: Manufacturer's standard mildew-resistant, washable, vinyl-coated fabric wall covering; Class A, ASTM E84. Vinyl shall not peel, craze or crack after repeated operations or long idle standing and shall remain flexible when cold.
 - 1. Total Weight: Minimum 1000 g/sq.m. (27 oz./sq.yd.).
 - 2. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.
 - 3. Maximum Flame Spread: 25.
 - 4. Maximum Smoke Developed: 50.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of accordion folding partitions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by accordion folding partition manufacturer's written installation instructions. Install accordion folding partitions level and plumb, with tight joints and uniform appearance, and free of deformation and surface and finish irregularities.
- B. Install accordion folding partitions and accessories after other finishing operations, including painting, have been completed.

3.3 ADJUSTING

- A. Adjust accordion folding partitions to operate smoothly, without warping or binding. Lubricate hardware and other moving parts.

3.4 CLEANING

- A. Clean soiled surfaces of accordion folding partitions, to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

--- END ---

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies wall guards (crash rails or bumper rails) and corner guards.

1.2 RELATED WORK

- A. Solid wood wall guards: Section 06 20 00, FINISH CARPENTRY.
- B. Armor plates, kick plates, and door protection not specified in this section: Section 08 71 00, DOOR HARDWARE.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Wall Guards.
 - 2. Corner Guards.
- D. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
- B. Protect from damage from handling and construction operations before, during and after installation.
- C. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate,
Sheet, and Strip
- C. Code of Federal Regulations (CFR):
40 CFR 59, Subpart D.....National Volatile Organic Compound Emission Standards for
Architectural Coatings
- D. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

1.6 COORDINATION

- A. Coordinate provision of blocking and other supports installed in walls and partitions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- B. Stainless Steel Plate: ASTM A167, Type 304.
- C. Adhesive: As recommended by wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 CORNER GUARDS

- A. Stainless Steel Corner Guards: Fabricate of minimum 1.5 mm (0.060-inch) thick stainless steel. Form guards of dimensions and to contour shown.
 - 1. Wing Size: Nominal 90 by 90 mm (3-1/2 by 3-1/2 inches).
 - 2. Corner Radius: 3 mm (1/8 inch).
 - 3. Bottom Heights: As follows:
 - a. Bottom of corner guard shall be mounted directly above scheduled base. Coordinate corner guard bottom height with scheduled base.

4. Top Heights: As indicated on Drawings or where not indicated on Drawings provide heights as follows:
 - a. Top of corner guard shall be mounted at same height as top of door frames unless indicated otherwise.
 - b. Corner guards shall be provided in two pieces where interrupted by surface mounted wall guards, chair rails, or other items that extend continuously around corners.
 5. Mounting: Adhesive.
- B. Stainless Steel End Wall Corner Guards: Same as corner guards except in a U shaped configuration with two wings and a middle section for covering end of wall partition. Coordinate width of middle section with wall partition widths.

2.3 WALL GUARDS

- A. Stainless Steel Crash Rail: Heavy-duty assembly consisting of stainless steel components with continuous snap-on stainless steel cover installed over concealed retainer system; designed to withstand impacts.
1. Cover: Stainless steel, minimum 1.5-mm (0.060-inch) wall thickness; as follows:
 - a. Profile: Flat with V-shaped groove at mid-height.
 - 1) Dimensions: Nominal 140 mm high by 38 mm deep (5 1/2 inches high by 1 1/2 inch deep).
 - 2) Surface: Plain.
 2. Retainer Clips: Manufacturer's standard impact-absorbing stainless steel clips designed for heavy-duty performance.
 3. End Caps: Prefabricated, stainless steel; matching cover finish.
 4. Accessories: Concealed splices and mounting hardware.
 5. Mounting: Surface mounted directly to wall.

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.

PART 3 - INSTALLATION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment.
 - 1. For impact-resistant wall protection units attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 STAINLESS STEEL CORNER GUARDS

- 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 adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow to cure undisturbed for 24 hours.

3.4 WALL GUARDS (BUMPER RAIL)

- A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions.

3.5 CLEANING

- A. Remove excess adhesive using methods and materials recommended in writing by manufacturer.
- B. Comply with Green Guide for Healthcare requirements for cleaning.

--- E N D ---

**SECTION 12 24 00
WINDOW SHADES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Roller shades are specified in this section. Roller shades shall be furnished complete, including brackets, fittings and hardware.

1.2 RELATED WORK

- A. Color of shade band and color of exposed parts of roller shades: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY CONTROL

- A. Manufacturer's Qualification: Roller shades manufacturer shall provide evidence that the manufacture of shades are a major product, and that the shades have performed satisfactorily on similar installations.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Shade band material, each type, 600 mm (24 inch) square, showing color, finish and texture.
- C. Manufacturer's literature and data; showing details of construction and hardware for each indicated product. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- D. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, trim, attachments to other work, operational clearances, and relationship to adjoining work.
- E. Product certificates indicating products comply with requirements and do not contain asbestos or lead.

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 (R2004) Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 - B221/B221M-07 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - D635-06 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
 - D648-07 Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
 - D1784 Rev.A-06 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D. National Fire Protection Association (NFPA):
 - NFPA 101-09 Life Safety Code
 - NFPA 701-04 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
- E. Window Covering Safety Council (WCSC):
 - WCMA A 100.1-02 Safety of Corded Window Covering Products (ANSI)

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A167
- B. Extruded Aluminum: ASTM B221/B221M.

2.2 ROLLER SHADES

- A. Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Product Standard: Provide roller shades complying with WCMA A 100.1.
- C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- D. Shade Band Material (Solar Shading): Thermoplastic Olefin (TPO).
 - 1. Fabric Width: As indicated on Drawings.
 - 2. Pattern: Full basket-weave, non-directional.
 - 3. Style: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 4. Colors: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 5. Material Openness Factor: 1 percent or 5 percent.
 - 6. Material UV Blockage: 99 percent or 95 percent.
 - 7. Bottom Hem: Straight.
 - 8. Trim: As indicated by manufacturer's designation for style and color.
- E. Shade Band Material (Room Darkening): PVC-free acrylic-coated fiberglass.
 - 1. Fabric Width: As indicated on Drawings.
 - 2. Pattern: Close-woven, opaque.
 - 3. Style: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 4. Colors: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 5. Bottom Hem: Straight.
 - 6. Trim: As indicated by manufacturer's designation for style and color.
- F. Rollers: Electro-galvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with manufacturer's standard method for attaching shade material. Provide capacity for two roller shade bands per roller.
- G. Direction of Roll: Regular, from back of roller.
- H. Mounting Brackets: Galvanized or zinc-plated steel.
- I. Pocket with Ceiling Slot Opening: Six-sided box units for recessed installation; fabricated from formed-steel sheet or extruded aluminum; with a bottom consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing rollers, brackets, and operating hardware and operators within; capacity for one roller shade per pocket, unless otherwise indicated.
 - 1. Roller Shade RS-1: One roller, solar shading (1 percent open) shade band.
 - 2. Roller Shade RS-2: Two rollers, solar shading (5 percent open) and room darkening shade bands.

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- a. Provide room darkening shade band at exterior side roller and solar shading shade band at interior side roller.
- 3. Corner Section: Factory formed and welded. Provide where windows are continuous around corners or where shade pocket housings are indicated on Drawings as continuous around corners.
- 4. Straight Transition Sections: Factory formed and welded. Provide matching closure panels or filler panels between pockets where shade pocket housings are indicated as continuous between windows.
- 5. Roller Shade Pocket Trim: Factory formed and welded. Provide matching trim between pockets and adjacent construction where indicated on Drawings and where required to fill space between shade pocket and windows, column enclosures, radiant panels, and other adjacent construction.
- J. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- K. Mounting: Recessed in ceiling pocket, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.
- L. Hold-Down Brackets and Hooks or Pins and Side Angles: Manufacturer's standard L-shaped angles designed for fixing shade in place, keeping shade band material taut, and reducing light gaps when shades are closed.
 - 1. Finish: Clear anodized.
 - 2. Locations: Roller shades with room darkening shade band.
- M. Shade Operation: Manual; with continuous-loop bead-chain, clutch, and cord tensioner and bracket lift operator.
 - 1. Position of Clutch Operator: Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated.
 - a. Provide clutch operator on left side of roller where operation is required on both sides of a multiple shade bay to avoid clutch operators located in the middle of a bay.
 - b. Provide clutch operator on left side of roller where Drawings indicate access is difficult on right side of window opening.
 - 2. Clutch: Capacity to lift size and weight of shade; sized to fit roller or provide adaptor.
 - 3. Loop Length: Length required to make operation convenient from floor level.
 - 4. Bead Chain: Nickel-plated metal or stainless steel.
 - a. Provide manufacturer's standard safety chain hold down brackets for bead chains, gray color.
 - 5. Operating Function: Stop and hold shade at any position in ascending or descending travel. Provide limit stops to prevent shade from being raised or lowered too far.

2.3 ROLLER SHADE FABRICATION

- A. Fabricate roller shades to fit measurements of finished openings obtained at site.

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- B. Concealed Components: Non-corrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 23 deg C (74 deg F):
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 6 mm (1/4 inch) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 - 1. Pocket color: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 FASTENINGS

- A. 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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. 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. Allow clearances for window operation hardware. 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 Resident Engineer.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to Resident Engineer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

--- E N D ---

SECTION 13 05 41
SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide seismic restraint in accordance with the requirements of this section in order to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event.
- B. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:
 - 1. Architectural Elements: Facades that are not part of the structural system and its shear resistant elements; cornices and other architectural projections and parapets that do not function structurally; glazing; nonbearing partitions; suspended ceilings; stairs isolated from the basic structure; cabinets; bookshelves; medical equipment; and storage racks.
 - 2. Electrical Elements: Power and lighting systems; substations; switchgear and switchboards; auxiliary engine-generator sets; transfer switches; motor control centers; motor generators; selector and controller panels; fire protection and alarm systems; special life support systems; and telephone and communication systems.
 - 3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems.

1.2 RELATED WORK:

- A. Section No. 08 80 00, GLAZING
- B. Section No. 09 22 16, NON-STRUCTURAL METAL FRAMING
- C. Section No. 09 51 00, ACOUSTICAL CEILINGS
- D. Division 22, PLUMBING
- E. Division 23, HEATING, VENTILATING, AND AIR CONDITIONING
- F. Division 26, ELECTRICAL

1.3 QUALITY CONTROL:

- A. Shop-Drawing Preparation:
 - 1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the state where the project is located.

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2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State where project is located.

B. Coordination:

1. Do not install seismic restraints until seismic restraint submittals are approved by the Resident Engineer.
2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submit a coordinated set of equipment anchorage drawings prior to installation including:
 1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
 2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified.
 3. Numerical value of design seismic brace loads.
 4. For expansion bolts, include design load and capacity if different from those specified.
- C. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:
 1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
 2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
 3. Pipe contents.
 4. Structural framing.
 5. Location of all gravity load pipe supports and spacing requirements.
 6. Numerical value of gravity load reactions.
 7. Location of all seismic bracing.
 8. Numerical value of applied seismic brace loads.
 9. Type of connection (Vertical support, vertical support with seismic brace etc.).
 10. Seismic brace reaction type (tension or compression). Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.
- D. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:
 1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
 2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
 3. Maximum spacing of hangers and bracing.
 4. Seal of registered structural engineer responsible for design.

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- E. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.
- F. Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

1.5 APPLICABLE PUBLICATIONS:

- A. The Publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):

501.6-2001Recommended Dynamic Test Method for Determining the
Seismic Drift Causing Glass Fallout from Wall Systems
- C. American Concrete Institute (ACI):

355.2-07Qualification for Post-Installed Mechanical Anchors in Concrete
and Commentary
- D. American Institute of Steel Construction (AISC):

Load and Resistance Factor Design, Volume 1, Second Edition.
- E. American Society of Civil Engineers, Structural Engineering Institute(ASCE/SEI):

ASCE/SEI 7-2005.....Minimum Design Loads for Buildings and Other Structures.
- F. American Society for Testing and Materials (ASTM):

A36/A36M-08Carbon Structural Steel.

A53/A53M-10Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and
Seamless.

A307-10.....Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength.

A325-10.....Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum
Tensile Strength.

A325M-05.....High-Strength Bolts for Structural Steel Joints [Metric].

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- A490-10ae1Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
- A490M-10High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric].
- A500/A500M-10aCold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- A501-07Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- A615/A615M-09bDeformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- A992/A992M-11Steel for Structural Shapes for Use in Building Framing.
- A996/A996M-09bRail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement.
- E488-96(2003)Standard Test Method for Strength of Anchors in Concrete and Masonry Elements.
- G. Ceilings and Interior Systems Construction Association (CISCA):
- CISCA Zones 0-2(2004).....Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings—Seismic Zones 0-2
- H. International Building Code (IBC) 2009 Edition.
- I. VA Seismic Design Requirements, H-18-8, February 2011.
- J. National Uniform Seismic Installation Guidelines (NUSIG).
- K. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. Seismic Restraint Manual - Guidelines for Mechanical Systems, 2008 Edition and Addendum.
- 1.6 Seismic Performance Requirement:
- A. Regulatory Requirement IBC 2009.
- B. Architectural Components and Cladding - Seismic Design Performance Requirements:

1. General:
 - a. Architectural components and cladding shall be designed, fabricated and installed to resist the equivalent static forces and displacements determined in accordance with ASCE 7- 05 for the following Project categories.
 - 1) Building Occupancy Category: IV.
 - 2) Seismic Design Category: C.
2. Nonstructural Component Anchorage: In conformance with §13.4 of ASCE 7-05.
3. Seismic Forces (F_p): Seismic forces shall be determined in accordance with §13.3.1 of ASCE 7-05, incorporating the following Project values.
 - a. spectral acceleration, short period (S_{DS}) = 0.25g.
 - b. component amplification factor (a_p):
 - 1) wall element: 1.0
 - 2) body of panel connection: 1.0
 - 3) fasteners of the connecting system: 1.25
 - c. component importance factor (I_p) = 1.5 unless otherwise indicated in individual specification section.
 - d. component operating weight (W_p) = as determined by manufacturer
 - e. component response modification factor (R_p):
 - 1) wall element: 2.5
 - 2) connection: 2.5
 - 3) fasteners: 1.0
 - f. height in structure at point of attachment (z) = as indicated on the Drawings.
 - g. average roof height of structure with respect to base (h) = as indicated on the Drawings.
 - h. When positive and negative wind loads exceed seismic forces (F_p), as defined in ASCE 7- 05, these wind loads shall govern the design.
4. Seismic Relative Displacement (D_p):
 - a. Values for component and cladding seismic relative displacement (D_p), shall be determined in accordance with ASCE 7- 05 Section 13.3.
5. Component Anchorage: In accordance with §13.4 of ASCE 7-05.
6. Exterior Nonstructural Wall Elements and Connections:
 - a. Exterior nonstructural wall panels or elements that are attached to or enclose the structure shall be designed, fabricated and installed to resist seismic force (F_p), and shall accommodate movements of the structure resulting from response to the design basis ground motion, seismic relative displacement (D_p), or temperature changes. Such elements shall be supported by means of positive and direct structural supports or by mechanical connections and fasteners. The support system shall be designed in accordance with §13.5.3 of ASCE 7-05
7. Out of Plane Bending: Traverse or out-of-plane bending or deformation of a component or system subject to seismic force (F_p) and seismic relative displacement (D_p) shall not exceed the deflection capability of the component or system.

8. Glazing Displacement:

- a. Glazing installed in exterior components and cladding and glazed interior partition system shall comply with the relative displacement requirements of §13.5.9 of ASCE 7-05 incorporating the following Project values.
 - 1) seismic relative displacement (D_p) = as defined herein
 - 2) occupancy importance factor (I) = 1.5
 - 3) relative seismic displacement causing glass fallout from the glazed component ($\Delta_{fallout}$) = determined in accordance with AAMA 501.6-01

C. Suspended Acoustical Ceilings - Seismic Design Performance Requirements:

1. General:

- a. Suspended ceiling system shall be designed to meet the seismic force requirements of the below-listed standards.

- 1) §13.5.6.1 of ASCE 7-05.
- 2) CISC Zones 0-2.

2. Seismic Forces (F_p): Seismic forces shall be determined in accordance with §13.3.1 of ASCE 7-05, incorporating the following Project values.

- a. spectral acceleration, short period (S_{DS}) = 0.25g.
- b. component amplification factor (a_p) = 1.0
- c. component importance factor (I_p) = 1.5
- d. component operating weight (W_p) = as determined by manufacturer
- e. component response modification factor (R_p) = 2.5
- f. height in structure at point of attachment (z) = as indicated on the Drawings.
- g. average roof height of structure with respect to base (h) = as indicated on the Drawings.
- h. The weight of the ceiling, W_p , shall include the ceiling grid and panels; light fixtures if attached to, clipped to, or laterally supported by the ceiling grid; and other components which are laterally supported by the ceiling. W_p shall be taken as not less than 4 lbs/ft².
- i. The seismic force, F_p , shall be transmitted through the ceiling attachments to the building structural elements or the ceiling-structure boundary.
- j. Design of anchorage and connections shall be in accordance with these provisions.

3. Seismic Design Category C:

- a. Suspended ceilings in Seismic Design Category C shall be designed and installed in accordance with CISC Zones 0-2, except that seismic forces shall be determined in accordance with §13.3.1 and §13.5.6.1 of ASCE 7-05.

D. Exceptions: The seismic restraint of the following items may be omitted:

- 1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
- 2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
- 3. Gas and medical piping less than 2 ½ inches inside diameter.

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4. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
5. All other piping less than 2 ½ inches inside diameter, except for automatic fire suppression systems.
6. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
7. All electrical conduits, less than 2 ½ inches inside diameter.
8. All rectangular air handling ducts less than six square feet in cross sectional area.
9. All round air handling ducts less than 28 inches in diameter.
10. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

PART 2 - PRODUCTS

2.1 STEEL:

- A. Structural Steel: ASTM A36.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Steel Pipe: ASTM A53/A53M, Grade B.

PART 3 - EXECUTION

3.1 CONSTRUCTION, GENERAL:

- A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.
- B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.
- C. Construct seismic restraints and anchorage to allow for thermal expansion. Provide seismic expansion joints at locations of existing building expansion joints.
- D. Testing Before Final Inspection:
 1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.
 2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3.2 EQUIPMENT RESTRAINT AND BRACING

- A. See drawings for equipment to be restrained or braced.

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3.3 MECHANICAL DUCTWORK and piping; electrical busways, conduits, and cable trays; and telecommunication wires and cable trays:

- A. Support and brace mechanical ductwork and piping; electrical busways, conduits and cable trays; and telecommunication wires and cable trays to resist directional forces (lateral, longitudinal and vertical).
- B. Brace duct branches with a minimum of 1 brace per branch.
- C. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment, or building members.
- D. Seismic Restraint of Piping:
 - 1. Design criteria:
 - a. Piping resiliently supported: Restrain to support 120 percent of the weight of the systems and components and contents.
 - b. Piping not resiliently supported: Restrain to support 60 percent of the weight of the system components and contents.
- E. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.
- F. Refer to Division 22, 23, and 26 sections for additional requirements.

3.4 PARTITIONS

- A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.

3.5 CEILINGS AND LIGHTING FIXTURES

- A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.
- B. Independently support and laterally brace all lighting fixtures. Refer to applicable portions of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

3.6 GLAZING

- A. Install attachments to structure for all glazing materials to ensure strength against applicable seismic forces at the project location.

--- E N D ---

SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The requirements of this Section shall apply to all sections of Division 22.
- B. Definitions:
 - 1. Exposed: Piping and equipment exposed to view in finished rooms.
 - 2. Option or optional: Contractor's choice of an alternate material or method.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- D. Section 05 31 00, STEEL DECKING, Section 05 36 00, COMPOSITE METAL DECKING: Building Components for Attachment of Hangers.
- E. Section 05 50 00, METAL FABRICATIONS.
- F. Section 07 84 00, FIRESTOPPING.
- G. Section 07 60 00, FLASHING AND SHEET METAL: Flashing for Wall and Roof Penetrations.
- H. Section 07 92 00, JOINT SEALANTS.
- I. Section 09 91 00, PAINTING.
- J. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

1.3 QUALITY ASSURANCE

- A. Products Criteria:
 - 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years.
 - 2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 160 km (100 miles) of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Names, mail and e-mail addresses and phone numbers of service organizations providing service under these conditions for (as applicable to the project): critical instrumentation.
 - 3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

4. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply. Any conflicts shall be brought to the attention of the Resident Engineer (RE)/Contracting Officers Technical Representative (COTR).
 5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
 8. Asbestos products or equipment or materials containing asbestos shall not be used.
- B. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Resident Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.
- C. Execution (Installation, Construction) Quality:
1. All items shall be applied and installed in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract drawings and specifications shall be referred to the RE/COTR for resolution. Written hard copies or computer files of manufacturer's installation instructions shall be provided to the RE/COTR at least two weeks prior to commencing installation of any item.
 2. Complete layout drawings shall be required by Paragraph, SUBMITTALS. Construction work shall not start on any system until the layout drawings have been approved.
- D. Guaranty: Warranty of Construction, FAR clause 52.246-21.
- E. Plumbing Systems: IPC, International Plumbing Code.
- 1.4 SUBMITTALS
- A. Submittals shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
 - B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.
 - C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
 - D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

- E. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.
 - F. Upon request by Government, lists of previous installations for selected items of equipment shall be provided. Contact persons who will serve as references, with telephone numbers and e-mail addresses shall be submitted with the references.
 - G. Manufacturer's Literature and Data: Manufacturer's literature shall be submitted under the pertinent section rather than under this section.
 - 1. Equipment and materials identification.
 - 2. Fire stopping materials.
 - 3. Hangers, inserts, supports and bracing.
 - 4. Wall, floor, and ceiling plates.
 - H. Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8-inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and adequate clearance for all equipment, piping, pumps, valves and other items. All valves, trap primer valves, water hammer arrestors, strainers, and equipment requiring service shall be provided with an access door sized for the complete removal of plumbing device, component, or equipment. Equipment foundations shall not be installed until equipment or piping until layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.
 - 1. Hangers, inserts, supports, and bracing.
 - 2. Pipe sleeves.
 - 3. Equipment penetrations of floors, walls or ceilings.
 - I. Maintenance Data and Operating Instructions:
 - 1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment.
 - 2. Listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided.
 - 3. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Protection of Equipment:
 - 1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
 - 2. Damaged equipment shall be replaced with an identical unit as determined and directed by the RE/COTR. Such replacement shall be at no additional cost to the Government.
 - 3. Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.

4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
- B. Cleanliness of Piping and Equipment Systems:
1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
 3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Government. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC), latest edition. All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
 4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.
- 1.6 APPLICABLE PUBLICATIONS
- A. The publications listed below shall 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):
Boiler and Pressure Vessel Code (BPVC):
SEC IX-2007..... Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications.
- C. American Society for Testing and Materials (ASTM):
A36/A36M-2008..... Standard Specification for Carbon Structural Steel
A575-96 (R 2007) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades R (2002)
E84-2005 Standard Test Method for Surface Burning Characteristics of Building Materials
E119-2008a Standard Test Methods for Fire Tests of Building Construction and Materials
- D. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
SP-58-02 Pipe Hangers and Supports-Materials, Design and Manufacture
SP 69-2003 (R 2004)..... Pipe Hangers and Supports-Selection and Application
- E. National Electrical Manufacturers Association (NEMA):
MG1-2003, Rev. 1-2007... Motors and Generators
International Code Council, (ICC):
IBC-06, (R 2007) International Building Code
IPC-06, (R 2007) International Plumbing Code

PART 2 - PRODUCTS

2.1 FACTORY-ASSEMBLED PRODUCTS

- A. Standardization of components shall be maximized to reduce spare part requirements.
- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts that are alike shall be products of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - 4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.
- C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment, which serve the same function, shall be the same make and model

2.2 COMPATIBILITY OF RELATED EQUIPMENT

- A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.3 SAFETY GUARDS

- A. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gage sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 6 mm (1/4-inch) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.
- B. All Equipment shall have moving parts protected from personal injury.

2.4 LIFTING ATTACHMENTS

- A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.5 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings, or shown in the maintenance manuals. Identification for piping is specified in Section 09 91 00, PAINTING.
- B. Valve Tags and Lists:
 - 1. Plumbing: All valves shall be provided with valve tags and listed on a valve list (Fixture stops not included).
 - 2. Valve tags: Engraved black filled numbers and letters not less than 13 mm (1/2-inch) high for number designation, and not less than 6.4 mm(1/4-inch) for service designation on 19 gage, 38 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.

3. Valve lists: Valve lists shall be created using a word processing program and printed on plastic coated cards. The plastic coated valve list card(s), sized 216 mm (8-1/2 inches) by 280 mm (11 inches) shall show valve tag number, valve function and area of control for each service or system. The valve list shall be in a punched 3-ring binder notebook. A copy of the valve list shall be mounted in picture frames for mounting to a wall.
4. A detailed plan for each floor of the building indicating the location and valve number for each valve shall be provided. Each valve location shall be identified with a color coded sticker or thumb tack in ceiling.

2.6 FIRE STOPPING

- A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping. Refer to Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION, for pipe insulation.

2.7 GALVANIZED REPAIR COMPOUND

- A. Mil. Spec. DOD-P-21035B, paint.

2.8 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

- A. In lieu of the paragraph which follows, suspended equipment support and restraints may be designed and installed in accordance with the International Building Code (IBC), latest edition, and SECTION 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS. Submittals based on the International Building Code (IBC), latest edition, SECTION 13 05 41 requirements, or the following paragraphs of this Section shall be stamped and signed by a professional engineer registered in a state where the project is located. The Support system of suspended equipment over 227 kg (500 pounds) shall be submitted for approval of the Resident Engineer in all cases. See these specifications for lateral force design requirements.
- B. Type Numbers Specified: MSS SP-58. For selection and application refer to MSS SP-69. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting.
- C. For Attachment to Concrete Construction:
 1. Concrete insert: Type 18, MSS SP-58.
 2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 102 mm (4 inches) thick when approved by the Resident Engineer for each job condition.
 3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 102 mm (4 inches) thick when approved by the Resident Engineer for each job condition.
- D. For Attachment to Steel Construction: MSS SP-58.
 1. Welded attachment: Type 22.
 2. Beam clamps: Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 23 mm (7/8-inch) outside diameter.
- E. Attachment to Metal Pan or Deck: As required for materials specified in Section 05 31 00, STEEL DECKING. Section 05 36 00, COMPOSITE METAL DECKING.
- F. For Attachment to Wood Construction: Wood screws or lag bolts.
- G. Hanger Rods: Hot-rolled steel, ASTM A36 or A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 38 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.

- H. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 41 mm by 41 mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts. Trapeze hangers are not permitted for steam supply and condensate piping.
 - 1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).
 - 2. Guide individual pipes on the horizontal member of every other trapeze hanger with 6 mm (1/4-inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 13 mm (1/2-inch) galvanized steel bands, or insulated calcium silicate shield for insulated piping at each hanger.
- I. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping. Refer to Section 23 07 11, HVAC, PLUMBING, and BOILER PLANT INSULATION for insulation thickness. To protect insulation, provide Type 39 saddles for roller type supports or insulated calcium silicate shields. Provide Type 40 insulation shield or insulated calcium silicate shield at all other types of supports and hangers including those for insulated piping.
 - 1. General Types (MSS SP-58):
 - a. Standard clevis hanger: Type 1; provide locknut.
 - b. Riser clamps: Type 8.
 - c. Wall brackets: Types 31, 32 or 33.
 - d. Roller supports: Type 41, 43, 44 and 46.
 - e. Saddle support: Type 36, 37 or 38.
 - f. Turnbuckle: Types 13 or 15.
 - g. U-bolt clamp: Type 24.
 - h. Copper Tube:
 - 1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, plastic coated or taped with isolation tape to prevent electrolysis.
 - 2) For vertical runs use epoxy painted or plastic coated riser clamps.
 - 3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.
 - 4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.
- J. Pre-insulated Calcium Silicate Shields:
 - 1. Provide 360 degree water resistant high density 965 kPa (140 psi) compressive strength calcium silicate shields encased in galvanized metal.
 - 2. Pre-insulated calcium silicate shields to be installed at the point of support during erection.
 - 3. Shield thickness shall match the pipe insulation.
 - 4. The type of shield is selected by the temperature of the pipe, the load it must carry, and the type of support it will be used with.
 - a. Shields for supporting cold water shall have insulation that extends a minimum of one inch past the sheet metal.

- b. The insulated calcium silicate shield shall support the maximum allowable water filled span as indicated in MSS-SP 69. To support the load, the shields shall have one or more of the following features: structural inserts 4138 kPa (600 psi) compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36) wear plates welded to the bottom sheet metal jacket.

5. Shields may be used on steel clevis hanger type supports, roller supports or flat surfaces.

2.9 PIPE PENETRATIONS

- A. Pipe penetration sleeves shall be installed for all pipes other than rectangular blocked out floor openings for risers in mechanical bays.
- B. Pipe penetration sleeve materials shall comply with all fire stopping requirements for each penetration.
- C. To prevent accidental liquid spills from passing to a lower level, provide the following:
 - 1. For sleeves: Extend sleeve 25 mm (1 inch) above finished floor and provide sealant for watertight joint.
 - 2. For blocked out floor openings: Provide 40 mm (1-1/2 inch) angle set in silicone adhesive around opening.
 - 3. For drilled penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.
- D. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of Resident Engineer.
- E. Sheet metal, plastic, or moisture resistant fiber sleeves shall be provided for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- F. Cast iron or zinc coated pipe sleeves shall be provided for pipe passing through exterior walls below grade. The space between the sleeve and pipe shall be made watertight with a modular or link rubber seal. The link seal shall be applied at both ends of the sleeve.
- G. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. A galvanized steel Sleeve shall be provided for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, sleeves shall be connected with a floor plate.
- H. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 25 mm (1 inch) greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation plus 25 mm (1 inch) in diameter. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.
- I. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

2.10 TOOLS AND LUBRICANTS

- A. Furnish, and turn over to the Resident Engineer, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the Resident Engineer.

- C. Lubricants: A minimum of 0.95 L (1 quart) of oil, and 0.45 kg (1 pound) of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application.

2.11 WALL, FLOOR AND CEILING PLATES

- A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.
- B. Thickness: Not less than 2.4 mm (3/32-inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025-inch) for up to 80 mm (3 inch) pipe, 0.89 mm (0.035-inch) for larger pipe.
- C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Wall plates shall be used where insulation ends on exposed water supply pipe drop from overhead. A watertight joint shall be provided in spaces where brass or steel pipe sleeves are specified.

2.12 ASBESTOS

- A. Materials containing asbestos are not permitted.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

- A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping, sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review.
- B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.
- C. Operating Personnel Access and Observation Provisions: All equipment and systems shall be arranged to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Maintenance and operating space and access provisions that are shown on the drawings shall not be changed nor reduced.
- D. Structural systems necessary for pipe and equipment support shall be coordinated to permit proper installation.
- E. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- F. Cutting Holes:
 - 1. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by RE/COTR where working area space is limited.

2. Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by RE/COTR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to RE/COTR for approval.
 3. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
- H. Protection and Cleaning:
1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Resident Engineer. Damaged or defective items in the opinion of the Resident Engineer, shall be replaced.
 2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Pipe openings, equipment, and plumbing fixtures shall be tightly covered against dirt or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- I. Many plumbing systems interface with the HVAC control system. See the HVAC control points list and section 23 09 23 DIRECT DIGITAL CONTROLS FOR HVAC
- J. Work in Existing Building:
1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01 00 00, GENERAL REQUIREMENTS for relocation of existing equipment, alterations and restoration of existing building(s).
 2. As specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will cause the least interfere with normal operation of the facility.
- K. Inaccessible Equipment:
1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Government.
 2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as electrical conduit, motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.
- 3.2 TEMPORARY PIPING AND EQUIPMENT
- A. Continuity of operation of existing facilities may require temporary installation or relocation of equipment and piping. Temporary equipment or pipe installation or relocation shall be provided to maintain continuity of operation of existing facilities.
- B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The requirements of Para. 3.1 shall apply.

- C. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Necessary blind flanges and caps shall be provided to seal open piping remaining in service.

3.3 RIGGING

- A. Openings in building structures shall be planned to accommodate design scheme.
- B. Alternative methods of equipment delivery may be offered and will be considered by Government under specified restrictions of phasing and service requirements as well as structural integrity of the building.
- C. All openings in the building shall be closed when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.
- D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility.
- E. Contractor shall check all clearances, weight limitations and shall provide a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.
- F. Rigging plan and methods shall be referred to RE/COTR for evaluation prior to actual work.

3.4 PIPE AND EQUIPMENT SUPPORTS

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Holes shall be drilled or burned in structural steel ONLY with the prior written approval of the Resident Engineer.
- B. The use of chain pipe supports, wire or strap hangers; wood for blocking, stays and bracing, or hangers suspended from piping above shall not be permitted. Rusty products shall be replaced.
- C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. A minimum of 15 mm (1/2-inch) clearance between pipe or piping covering and adjacent work shall be provided.
- D. For horizontal and vertical plumbing pipe supports, refer to the International Plumbing Code (IPC), latest edition, and these specifications.
- E. Overhead Supports:
 - 1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
 - 2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
 - 3. Tubing and capillary systems shall be supported in channel troughs.
- F. Floor Supports:
 - 1. For seismic anchoring, refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

3.5 LUBRICATION

- A. All equipment and devices requiring lubrication shall be lubricated prior to initial operation. All devices and equipment shall be field checked for proper lubrication.

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- B. All devices and equipment shall be equipped with required lubrication fittings. A minimum of one liter (one quart) of oil and 0.5 kg (one pound) of grease of manufacturer's recommended grade and type for each different application shall be provided. All materials shall be delivered to RE/COTR in unopened containers that are properly identified as to application.
- C. A separate grease gun with attachments for applicable fittings shall be provided for each type of grease applied.
- D. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.
- E. All lubrication points shall be extended to one side of the equipment.

3.6 PLUMBING SYSTEMS DEMOLITION

- A. Rigging access, other than indicated on the drawings, shall be provided after approval for structural integrity by the RE/COTR. Such access shall be provided without additional cost or time to the Government. Where work is in an operating plant, approved protection from dust and debris shall be provided at all times for the safety of plant personnel and maintenance of plant operation and environment of the plant.
- B. Unless specified otherwise, all piping, wiring, conduit, and other devices associated with the equipment not re-used in the new work shall be completely removed from Government property. This includes all pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. All openings shall be sealed after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.
- C. All valves including gate, globe, ball, butterfly and check, all pressure gages and thermometers with wells shall remain Government property and shall be removed and delivered to RE/COTR and stored as directed. The Contractor shall remove all other material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from Government property expeditiously and shall not be allowed to accumulate.
- D. Asbestos Insulation Removal: Conform to Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.

3.7 CLEANING AND PAINTING

- A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Government, the plant facilities, equipment and systems shall be thoroughly cleaned and painted. Refer to Section 09 91 00, PAINTING.
- B. In addition, the following special conditions apply:
 - 1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks. All rust shall be removed prior to painting and from surfaces to remain unpainted. Scratches, scuffs, and abrasions shall be repaired prior to applying prime and finish coats.
 - 2. The following Material And Equipment shall NOT be painted::
 - a. Regulators.
 - b. Pressure reducing valves.
 - c. Control valves and thermostatic elements.
 - d. Lubrication devices and grease fittings.

- e. Copper, brass, aluminum, stainless steel and bronze surfaces.
 - f. Valve stems and rotating shafts.
 - 3. Control and instrument panels shall be cleaned and damaged surfaces repaired. Touch-up painting shall be made with matching paint obtained from manufacturer or computer matched.
 - 4. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same color as utilized by the pump manufacturer
 - 5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats.
 - 6. The final result shall be a smooth, even-colored, even-textured factory finish on all items. The entire piece of equipment shall be repainted, if necessary, to achieve this.
- 3.8 IDENTIFICATION SIGNS
- A. Pipe Identification: Refer to Section 09 91 00, PAINTING.
- 3.9 STARTUP AND TEMPORARY OPERATION
- A. Start up of equipment shall be performed as described in the equipment specifications. Vibration within specified tolerance shall be verified prior to extended operation. Temporary use of equipment is specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.
- 3.10 OPERATING AND PERFORMANCE TESTS
- A. Prior to the final inspection, all required tests shall be performed as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TESTS and submit the test reports and records to the Resident Engineer.
 - B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.
 - C. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then make performance tests such systems respectively during first actual seasonal use of respective systems following completion of work.
- 3.11 OPERATION AND MAINTENANCE MANUALS
- A. Provide four bound copies. The Operations and maintenance manuals shall be delivered to RE/COTR not less than 30 days prior to completion of a phase or final inspection.
 - B. All new and temporary equipment and all elements of each assembly shall be included.
 - C. Manufacturer's installation, maintenance, repair, and operation instructions for each device shall be included. Assembly drawings and parts lists shall also be included. A summary of operating precautions and reasons for precautions shall be included in the Operations and Maintenance Manual.
 - D. Lubrication instructions, type and quantity of lubricant shall be included.
 - E. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications shall be included.
 - F. Set points of all interlock devices shall be listed.
 - G. Trouble-shooting guide for the control system troubleshooting guide shall be inserted into the Operations and Maintenance Manual.

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- H. The combustion control system sequence of operation corrected with submittal review comments shall be inserted into the Operations and Maintenance Manual.
 - I. Emergency procedures.
- 3.12 INSTRUCTIONS TO VA PERSONNEL
- A. Instructions shall be provided in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.

--- E N D ---

SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes the requirements for general-duty valves for domestic water and sewer systems.

1.2 RELATED WORK

- A. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

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. Valves.
2. Pressure Reducing Valves.
3. All items listed in Part 2 - Products.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):A536-84(R 2004) Standard Specification for Ductile Iron Castings
- C. American Society of Sanitary Engineering (ASSE)
ASSE 1003-01 (R 2003)... Performance Requirements for Water Pressure Reducing Valves
ASSE 1012-02..... Backflow Preventer with Intermediate Atmospheric Vent
ASSE 1013-05..... Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers
- D. International Code Council (ICC)
IPC-06 (R 2007) International Plumbing Code
- E. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
- F. SP-25-98..... Standard Marking System for Valves, Fittings, Flanges and Unions
SP-67-02a (R 2004) Butterfly Valve of the Single flange Type (Lug Wafer)
SP-70-06 Cast Iron Gate Valves, Flanged and Threaded Ends.
SP-72-99 Ball Valves With Flanged or Butt Welding For General Purpose
SP-80-03 Bronze Gate, Globe, Angle and Check Valves.
SP-110-96 Ball Valve Threaded, Socket Welding, Solder Joint, Grooved and Flared Ends

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Valves shall be prepared for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set ball and plug valves open to minimize exposure of functional surfaces
- B. Valves shall be prepared for storage as follows:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature.

PART 2 – PRODUCTS

2.1 VALVES

- A. Asbestos packing and gaskets are prohibited.
- B. Bronze valves shall be made with dezincification resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc shall not be permitted.
- C. Valves in insulated piping shall have 50 mm or DN50 (2 inch) stem extensions and extended handles of non-thermal conductive material that allows operating the valve without breaking the vapor seal or disturbing the insulation. Memory stops shall be fully adjustable after insulation is applied.
- D. Ball valves, pressure regulating valves, gate valves, globe valves, and plug valves used to supply potable water shall meet the requirements of NSF 61.
- E. Shut-off:
 - 1. Cold, Hot and Re-circulating Hot Water:
 - a. 50 mm or DN50 (2 inches) and smaller: Ball, MSS SP-72, SP-110, Ball valve shall be full port three piece or two piece with a union design with adjustable stem package. Threaded stem designs are not allowed. The ball valve shall have a SWP rating of 1035 kPa (150 psig) and a CWP rating of 4140 kPa (600 psig). The body material shall be Bronze ASTM B584, Alloy C844. The ends shall be solder,
 - b. Less than 100 mm DN100 (4 inches): Butterfly shall have an iron body with EPDM seal and aluminum bronze disc. The butterfly valve shall meet MSS SP-67, type I standard. The butterfly valve shall have a SWP rating of 1380 kPa (200 psig). The valve design shall be lug type suitable for bidirectional dead-end service at rated pressure. The body material shall meet ASTM A 536, ductile iron.
 - 1) Grooved end, ductile iron butterfly valves. The grooved butterfly valve shall meet the MSS SP-67 standard. The grooved butterfly valve shall have a CWP rating of 1380 kPa (200 psig). The valve materials shall be polyamide coated ductile iron conforming to ASTM A536 with two piece stainless steel stem, EPDM encapsulated ductile iron disc, and EPDM seal. The butterfly valve shall be gear operated
- F. Check:
 - 1. Check valves less than 80 mm or DN80 (3 inches) and smaller) shall be class 125, bronze swing check valves with non metallic Buna-N disc. The check valve shall meet MSS SP-80 Type 4 standard. The check valve shall have a CWP rating of 1380 kPa (200 psig). The check valve shall have a Y pattern horizontal body design with bronze body material conforming to ASTM B 62, solder joints, and PTFE or TFE disc.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Valve interior shall be examined for cleanliness, freedom from foreign matter, and corrosion. Special packing materials shall be removed, such as blocks, used to prevent disc movement during shipping and handling.
- B. Valves shall be operated in positions from fully open to fully closed. Guides and seats shall be examined and made accessible by such operations.
- C. Threads on valve and mating pipe shall be examined for form and cleanliness.
- D. Mating flange faces shall be examined for conditions that might cause leakage. Bolting shall be checked for proper size, length, and material. Gaskets shall be verified for proper size and that its material composition is suitable for service and free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Valves shall be located for easy access and shall be provide with separate support. Valves shall be accessible with access doors when installed inside partitions or above hard ceilings.
- C. Valves shall be installed in horizontal piping with stem at or above center of pipe
- D. Valves shall be installed in a position to allow full stem movement.
- E. Check valves shall be installed for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

- A. Valve packing shall be adjusted or replaced after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves shall be replaced if persistent leaking occurs.

-- E N D --

**SECTION 22 11 00
FACILITY WATER DISTRIBUTION
(PLUMBING SYSTEMS)**

PART 1 – GENERAL

1.1 DESCRIPTION

This section specifies the provisions for the furnishing and installing the domestic water, sanitary sewerage and storm drainage systems including piping, equipment and all necessary accessories.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Division 01, GENERAL REQUIREMENTS: Work performance.
- B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.
- C. Section 07 92 00, JOINT SEALANTS: Sealing around penetrations to prevent moisture and water migration.
- D. Section 09 91 00, PAINTING: Identification and painting of pipe and other devices.
- E. Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS: General mechanical requirements and items common to more than one section of Division 22, 23.
- F. Section 23 07 11, HVAC – PLUMBING – BOILER PLANT INSULATION: Piping insulation.

1.3 QUALITY ASSURANCE

Refer to specification Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data:
 - 1. Piping, Fittings, Couplings, Adapters, Solder.
 - 2. Dielectric Fittings.
 - 3. Strainers.
 - 4. Valves of all types required.
 - 5. Cleanouts.
 - 6. All required items listed in Part 2 – Products.
 - 7. All fixtures shown on the plumbing schedule and drawings.

- B. Shop Drawing: Details of clamping device and extensions when required in connection with the waterproofing membrane or the floor drain.
- C. Coordination Drawings: Refer to Article, SUBMITTALS, in Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.
- D. Operation and Maintenance Manuals: Submit in accordance with Article, INSTRUCTION MANUALS, in Section 01 00 00, GENERAL REQUIREMENTS.
- E. As-Built Piping Diagrams: Provide detailed drawings for the plumbing systems such as chilled/hot water, steam/condensate system, domestic and plumbing piping.
 - 1. Two sets of full size (Scaled: 1/8" = 1'-0") reproducible drawings.
 - 2. Two sets of half size reproducible drawings.
- F. Certifications: Prior to the next Section of plumbing work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by a plumbing system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. American National Standards Institute (ANSI):
 - American Society of Mechanical Engineers (ASME):
 - A11.21.1M Floor Drains ANSI/ASME
 - A13.1 Scheme for Identification of Piping Systems ANSI/ASME
 - B16.3 Malleable Iron Threaded Fittings ANSI/ASME
 - B16.4 Cast Iron Threaded Fittings Classes 125 and 250 ANSI/ASME
 - B16.9 Factory-Made Wrought Steel Buttwelding Fittings ANSI/ASME
 - B16.11 Forged Steel Fittings, Socket-Welding and Threaded ANSI/ASME
 - B16.12 Cast Iron Threaded Drainage Fittings ANSI/ASME
 - B16.15 Cast Bronze Threaded Fittings ANSI/ASME
 - B16.18 Cast Copper Alloy Solder-Joint Pressure Fittings ANSI/ASME
 - B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ANSI/ASME
 - B31.8 Gas Transmission and Distribution Piping Systems ANSI/ASME
 - B40.1 Gauges, Pressure Indicating Dial Type - Elastic Element ANSI/ASME
 - B40.100 Pressure Gauges and Gauge Attachments ANSI/ASME
- B. American Society of Sanitary Engineers (ASSE):
 - 1001 Pipe Applied Atmospheric Type Vacuum Breakers
 - 1010 Performance Requirements for Water Hammer Arresters

- 1013.....Reduced Pressure Principle Backflow Preventers
- 1015.....Double Check Backflow Prevention Assembly
- 1018.....Performance for trap seal primer valve-water supply fed
- 1020.....Vacuum Breakers, Anti-Siphon, Pressure Type
- C. American Society for Testing and Materials (ASTM):
 - A47Ferritic Malleable Iron Castings
 - A53Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
 - A74Cast Iron Soil Pipe and Fittings
 - A183Carbon Steel Track Bolts and Nuts
 - A312Seamless and Welded Austenitic Stainless Steel Pipe
 - A536Ductile Iron Castings
 - A733Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
 - A888Hubless Cast Iron Soil Pipe and Fittings
 - B32Solder Metal
 - B61Steam or Bronze Castings
 - B62Composition Bronze or Ounce Metal Castings
 - B75Seamless Copper Tube
 - B88Seamless Copper Water Tube
 - B306Copper Drainage Tube (DWV)
 - B584Copper Alloy Sand Castings for General Applications
 - B687Brass, Copper, and Chromium-Plated Pipe Nipples
 - B813Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
 - C564Rubber Gaskets for Cast Iron Soil Pipe and Fittings
 - D2000Rubber Products in Automotive Applications
 - E1120Standard Specification For Liquid Chlorine
 - E1229Standard Specification For Calcium Hypochlorite
- D. American Water Works Association (AWWA):
 - C110Ductile Iron and Gray Iron Fittings - 75 mm thru 1200 mm (3 inch thru 48 inches) for Water and other liquids
 - C151/A21.51.....Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids AWWA/ ANSI
 - C651Disinfecting Water Mains
- E. American Welding Society (AWS):
 - A5.8Filler Metals for Brazing
 - B2.1Welding Procedure and Performance Qualifications

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- B2.2 Standard for Brazing Procedure and Performance
- F. Cast Iron Soil Pipe Institute (CISPI):
 - 301 Hubless Cast Iron Soil and Fittings
- G. Factory Mutual (FM):
 - Coupling Used in Hubless Cast Iron Systems for Drains, Waste and Vent Systems
- H. Federal Specifications (Fed. Spec.):
 - A-A-1427C Sodium Hypochlorite Solution
 - A-A-59617 Unions, Brass or Bronze Threaded, Pipe Connections and Solder-Joint Tube Connections
 - L-T-1512A Tape, Pressure Sensitive Adhesive, Pipe Wrapping
 - WW-P-351 Red Brass, Seamless, Standard Pipe Size, Regular and Extra Strong
 - WW-V-35C Valves, Ball, Brass or Bronze
 - WW-V-1967 Valve, Butterfly (Threaded Ends and Solder Ends)
- I. International Association of Plumbing and Mechanical Officials (IAPMO):
 - Uniform Plumbing Code
 - IS-6 Installation Standard
- J. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
 - SP-67 Butterfly Valve of the Single flange Type (Lug Wafer)
 - SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends
 - SP-72 Ball Valves With Flanged or Butt Welding For General Purpose
 - SP-80 Bronze Gate, Globe, Angle and Check Valves
 - SP-110 Ball Valve Threaded, Socket Welding, Solder Joint, Grooved and Flared Ends
- K. National Association of Plumbing - Heating - Cooling Contractors (PHCC):
 - National Standard Plumbing Code
- L. Plumbing and Drainage Institute (PDI):
 - WH-201 Water Hammer Arrestor

PART 2 – PRODUCTS

2.1 INTERIOR DOMESTIC WATER PIPING

- A. Pipe: Copper tube, ASTM B88, Type L, hard drawn tested to 125 psig.
- B. Fittings for Copper Tube:
 - 1. Bronze castings or wrought copper conforming to ANSI B16.18 or B16.22. Unions shall be Bronze, MSS SP 72 & SP 110. Solder or braze joints.
- C. Adapters: Provide adapters for joining screwed pipe to copper tubing.

- D. Solder: ASTM B32, lead and antimony free composition, 95.6-0.4-4 tin-silver-copper Sn Ag Cu using non-corrosive lead free flux.
- E. Brazing alloy: AWS A5.8, Classification B Cu P.
- F. Reagent Grade Water Piping and Dialysis Water Piping: Not Applicable.

2.2 EXPOSED WATER AND WASTE PIPING

- A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed water and waste piping connecting fixtures, casework, cabinets, and equipment when not concealed by apron including those furnished by the Government or specified in other sections.
 - 1. Pipe: Fed. Spec. WW-P-351, Brass of standard weight.
 - 2. Fittings: ANSI B16.15, Cast Bronze threaded fittings with chrome finish (125 and 250).
 - 3. Nipples: ASTM B 687, Chromium-plated.
 - 4. Unions: MSS SP-72, SP-110, Brass or Bronze with chrome finish. Unions 2-1/2 inches and larger shall be flange type with approved gaskets.
 - 5. Valves: Fed. Spec. WW-V-35C, Ball, Brass or Bronze.

2.3 DIELECTRIC FITTINGS

- A. Provide dielectric couplings or unions between ferrous and non-ferrous pipe.
- B. 2 inches and Smaller: Threaded dielectric union, ANSI B16.39.
- C. 2-1/2 inches and Larger: Flange union with dielectric gasket and bolt sleeves, ANSI B16.42.
- D. Temperature Rating: 210 Degrees F for water systems, 250 Degrees F for steam condensate and as required for steam service.

2.4 STERILIZATION CHEMICALS

- A. Liquid Chlorine: ASTM E1120.
- B. Hypochlorite: ASTM E1229, or Fed. Spec. AA-1427C, Grade B.

2.5 WATERPROOFING

- A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.
- B. Floors: Provide cast iron stack sleeve with flashing device and a under deck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.
- C. Walls: See detail shown on drawings.

2.6 WATER HAMMER ARRESTER

Closed copper tube chamber with permanently sealed 410 kPa (60 psig) air charge above a triple o-ring piston. Three high heat Buna-N O-rings pressure packed and lubricated with FDA approved Dow Corning No. 11 silicone compound. All units shall be designed in accordance with ASSE 1010 for sealed wall installations without an access panel. Size and install in accordance with Plumbing and Drainage Institute requirements. Unit shall be as manufactured by Precision Plumbing Products Inc., Watts or Sioux Chief. Provide water hammer arresters at all solenoid valves, at all groups of two or more flush valves, at all quick opening or closing valves, and at all medical washing equipment.

2.7 SANITARY WASTE AND VENT PIPING

- A. Cast Iron Soil Pipe and Fittings: May be used for sanitary waste and vent piping for extension of piping from the existing. Pipe shall be plain end (no-hub), modified hub, or bell and spigot as required by selected jointing method.

1. Material (Pipe and Fittings): ASTM A74 or ASTM A888 and CISPI 301, Service Class.
 2. Joints: Provide one of the following types to suit pipe furnished.
 - a. Double seal, compression-type molded neoprene gasket. Gaskets shall suit class of pipe being jointed.
 - b. Mechanical: Meet the requirements and criteria for pressure, leak, deflection and shear tests as outlined in Factory Mutual No. 1680 for Class 1 couplings.
 - 1) Stainless steel clamp type coupling of elastomeric sealing sleeve, ASTM C564 and a Series 300 stainless steel shield and clamp assembly. Sealing sleeve with center-stop to prevent contact between pipes/fittings being joined shall be marked ASTM C564.
 - 2) Cast iron coupling with neoprene gasket, and stainless steel bolts and nuts.
 - c. Adapters: Where service weight pipe is connected to extra heavy pipe and extra heavy fittings of chair carriers provide adapters or similar system to make tight, leakproof joints.
 - B. Copper Pipe and Fittings: May be used for piping above ground, except for urinal drains.
 1. Pipe: ASTM B88, Type K, hard drawn copper tested to 125 psig.
 2. Fittings:
 - a. Solder type.
 - b. Grooved fittings, 50 to 150 mm (2 to 6 inch) wrought copper conforming to ASTM B75 C12200, 125 to 150 mm (5 to 6 inch) bronze casting conforming to ASTM B584, CDA 844(81-3-7-9). Mechanical grooved couplings, ductile iron, ASTM A536 (Grade 65-45-12), or malleable iron, ASTM A47 (Grade 32510) housings, with EPDM gasket, steel track head bolts, ASTM A183, coated with copper colored alkyl enamel.
 3. Solder: ASTM B32, lead free, 95 TA tin-antimony composition, Ag 95 (Silver) and Sb 5 (Antimony), Sb 5 (Antimony) HA/HB using non-corrosive lead free flux.
 4. Brazing alloy: AWS A5.8, Classification BCuP.
- 2.8 CLEANOUTS
- A. Same size as the pipe, up to 100 mm (4 inches); not less than 100 mm (4 inches) for larger pipe. Cleanouts for chemical waste drain pipe shall be of same material as the pipe. Cleanouts shall be easily accessible at each alternate change in pipe direction. Provide a minimum clearance of 600 mm (24 inches) for rodding.
 - B. Provide cleanouts at or near the base of the vertical stacks with the cleanout plug located approximately 600 mm (24 inches) above the floor. If there are no fixtures installed on the lowest floor, the cleanout shall be installed at the base of the stack. Extend the cleanouts to the wall access cover. Cleanout shall consist of sanitary tees. Furnish nickel-bronze square frame and stainless steel cover with minimum opening of 150 by 150 mm (6 by 6 inches) at each wall cleanout. Where the piping is concealed, a fixture trap or a fixture with integral trap, readily removable without disturbing concealed roughing work, shall be accepted as a cleanout equivalent providing the opening to be used as a cleanout opening is the size required by the NPHCC National Standard Code.
- 2.9 TRAPS
- Provide on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and set screw escutcheons. Concealed traps may be rough cast brass or same material as pipe connected to.

Slip joints not permitted on sewer side of trap. Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture.

2.10 VALVES

- A. Asbestos packing is prohibited.
- B. Shut-off:
 - 1. Cold Hot Water:
 - a. From 50 mm (2 inches) and Smaller: Ball, MSS SP-72 or SP-110, Type II, Class 125, Style 1 (permits inspection and repair of seats and seals without removing the valve from the line), three piece or double union end construction, full ported, full flow, solder connections, 2760 kPa (400 psi) WOG.

PART 3 – EXECUTION

3.1 DEMOLITION

- A. Cut and cap branch piping for water, waste and vent from the respective piping systems and disconnect all fixtures shown on drawings, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other Sections. Verify that no other fixtures are connected to deleted lines. All waste drain lines inside the building shall be cut and capped at the nearest termination point to other fed lines below the floor level.
- B. All original building plumbing/steam pipes where originally insulated with asbestos. Work performed on these pipes shall be conducted in compliance with all applicable State & Federal requirements.

3.2 GENERAL

- A. The contract drawings are diagrammatic only intended to show general layout of conduit, ductwork, piping, equipment, assemblies, specialties and do not identify all required accessories, components, details, fittings, pipe, offsets, equipment, etc. that may be necessary to properly complete the installation for the purpose intended. Provide all necessary accessories, components, details, fittings, pipe, offsets, equipment, etc based on field measurements and reviewed coordination drawings. Coordinate with other trades for space available and relative location of equipment and accessories to be connected at all locations. It is the intent of the drawings/specifications that the Contractor provides **all** materials, labor and coordination necessary to complete the work described or implied by the contract documents at no additional cost/time to the Government. Interferences and clearance difficulties shall be anticipated and items shall be altered where necessary to avoid the difficulties. Contractor shall determine the exact routing and location of systems prior to fabrication and installation. Accurate field measurements and coordination drawings shall be prepared to establish the locations and characteristics of the various systems (new and existing to remain). Contractor shall propose with submitted coordination drawings other solutions with the same flow characteristics where necessary to avoid interferences and clearance difficulties. **Should the contract documents not agree with themselves the greater quantity of superior work and materials shall be performed.**
- B. Store materials to avoid excessive exposure to weather or foreign materials. Keep inside of piping relatively clean during installation and protect open ends when work is not in progress.
- C. Installation:
 - 1. Comply with the PHCC National Standard Plumbing Code.
 - 2. Install branch piping for water and waste from the respective piping systems and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.

3. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, except for plastic and glass, shall be reamed to full size after cutting.
 4. All gravity waste drain lines inside the building with vertical drops over 6 m (20 feet) shall be provided with joint restraint on the vertical drop and horizontal offset or branch below the vertical drop. Joint restraint shall be accomplished by threaded, soldered, lead and oakum or grooved joints or a combination of pipe clamps and tie-rods as detailed in NFPA 24. Vertical joint restraint shall be provided from the fitting at the bottom of the vertical drop through every joint up to the riser clamp at the floor penetration of the floor above. Horizontal joint restraint shall be provided from the same fitting at the bottom of the vertical drop through every joint on the horizontal offset or branch for a minimum of 18 m (60 feet) or to anchoring point from the building structure.
 5. Install cast escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
 6. Provide cleanouts for horizontal sanitary lines at every change in direction, and at 50 foot minimum intervals.
 7. Provide hose bibbed chain capped ball valves at every low point in water systems that can trap fluid during a drain down.
 8. Re-hang unsupported existing utility service lines above ceiling where affected by work with suitable support devices in compliance with applicable codes.
 9. Contractor shall utilize pipe freeze technology as specified by Freeze Seal Engineering (New Castle, DE) for attaching new plumbing to existing building systems in the likely event that building risers cannot be shut down.
- D. Piping shall conform to the following:
1. Soil, Waste, Storm Water Drain and Vent to main stacks:

<u>Pipe Size</u>	<u>Minimum Pitch</u>
a. 3 inches and smaller	1 : 50 (1/4" to the foot)
b. 4 inches and larger	1 : 100 (1/8" to the foot)
 2. Domestic Water:
 - a. Where possible, grade all lines to facilitate drainage. Provide hose bibbed chain capped ball valves at bottom of every riser for drain down. All unnecessary traps in circulating lines shall be avoided.
 - b. Connect branch lines at bottom of main serving fixtures below and pitch down so that main may be drained through fixture. Connect branch lines to top of main serving only fixtures located on floor above.
 3. Unless shown otherwise, locate piping in ceilings, walls, soffits or otherwise concealed.
- E. Pipe Hangers, Supports and Accessories: Refer to PART 3 of Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS. Provide supports as needed at valves, strainers, in-line pumps and other heavy components. Piping layout is based on piping flexibility from sufficient offsets. Placement of supports and hangers should not restrict pipe expansion.
1. Shall be supported in compliance the National Standard Plumbing Code. Support piping securely no greater than 7 foot increments between supports.
 2. Seismic Bracing: Refer to Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

3. Shop Painting and Plating: Hangers, supports, rods, inserts and accessories used for pipe supports shall be shop coated with red lead or zinc Chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper tubing.
 4. Floor, Wall and Ceiling Plates, Supports, Hangers:
 - a. Solid or split un-plated cast iron.
 - b. All plates shall be provided with set screws.
 - c. Pipe Hangers: Height adjustable clevis type.
 - d. Adjustable Floor Rests and Base Flanges: Steel.
 - e. Concrete Inserts: "Universal" or continuous slotted type.
 - f. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
 - g. Riser Clamps: Malleable iron or steel.
 - h. Rollers: Cast iron.
 - i. Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.
 5. Hangers and supports utilized with insulated pipe and tubing shall have 180 degree (min.) metal protection shield centered on and welded to the hanger and support. The shield shall be 6 inches in length and be 16 Gauge steel. The shield shall be sized for the insulation.
 6. Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories. If the vertical distance exceeds 6 m (20 feet) additional support shall be provided to the center of the span.
- F. Each fixture and piece of equipment shall be supplied with individual ball valves to isolate hot/cold water to each device/fixture independently. These ball valves are in addition to the stop valves normally provided at the device/fixture location. Install valves with stem in horizontal position whenever possible.
1. Valves shall be easily accessible. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc.
 2. Locate valve stems in overhead piping in horizontal position. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.
 3. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.
 4. Provide unions adjacent to one end of all threaded valves.
 5. Control valves usually require reducers to connect to pipe sizes shown on the drawing.
 6. Provide hose bibbed chain capped ball valves at every low point in water system that can trap fluid during a drain down.
- G. Offset equipment/component connections and provide unions to allow service for maintenance and repair of serviceable devices with minimal removal of piping. Provide flexibility in equipment connections and branch line takeoffs with 3-elbow swing joints. Provide sufficient offsets, proper placement and type of hangers to allow pipe expansion and movement to avoid pipe stress and failure.

- H. All pipe runs shall be laid out to avoid interference with other work. Install piping generally parallel to walls and column center lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide 1 inch minimum clearance between adjacent piping or other surfaces. Unless shown otherwise, slope steam, condensate and drain piping down in the direction of flow not less than 1 inch in 40 feet. Provide eccentric reducers to keep bottom of sloped piping flat.
- I. Tee piping runouts or branches into the side of mains or other branches. Avoid bull-head tees, which are two return lines entering opposite ends of a tee and exiting out the common side.
- J. Connect piping to equipment as shown on drawings and as recommended by the manufacturer.
 - 1. Install components furnished by others such as: Flow elements (orifice unions), control valve bodies, flow switches, pressure taps with valve, and wells for sensors.
 - 2. Minor Piping: Generally, small diameter pipe runs from condensate, drains, and other services are not shown but must be provided.
 - 3. Unions: Install unions and shut-off ball valves on pressure piping at connections to equipment. Provide unions at all system components to allow service for maintenance and repair of serviceable devices with minimal removal of pipe.
 - 4. Provide dielectric connections where copper piping is connected to steel piping.
 - 5. Provide drain connection when a condensate drain system is indicated or required. Condensate drain system shall have cleanouts. Cleanouts shall be the same size as the pipe, up to 100 mm (4 inches); not less than 100 mm (4 inches) for larger pipe. Cleanouts shall be easily accessible at each alternate change in pipe direction. Provide a minimum clearance of 600 mm (24 inches) for rodding.
- K. Penetrations:
 - 1. Seal Proofing: Fill openings around un-insulated pipes penetrating floors and walls. Completely seal clearances around pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS, and Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.
 - 2. Fire Stopping:
 - a. Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between raceways and openings with fire stopping materials.
 - b. All temporary, concealed, framing lumber shall comply with MIL-L-19140 for fire retardant treatment, and shall bear the testing agency identification mark and performance rating.
 - c. All penetrations through fire/smoke walls are to be sleeved unless otherwise noted or directed by the VA Project Engineer. Install fire seal material at all penetrations, and troughs penetrating fire/smoke walls. All penetrations through fire/smoke walls (compartmentalization) will be sealed with appropriate fire retardant material on a daily basis, and shall maintain the same integrity as the fire barrier being sealed. The VA will be compensated through contractor contract reduction per day for each fire wall penetration not sealed with acceptable fire retardant material tested in accordance with ASTM E814 (F rating) by the close of business the day that penetration is made.
- L. All mechanical/plumbing lines shall use shut-off ball valves. Where connections are made to existing systems, shut-off ball valves are to be installed. Valves shall be marked with labeled brass tags, and a framed directory installed describing the location and function of each valve.

Provide hose bibbed chain capped ball valves at every low point in hydronic systems that can trap fluid during draining. Provide unions and removable pipe sections to all serviceable components in system.

- M. Install automatic trap primers at each floor drain and open traps (eg, at equipment condensate drains) according to manufactures' requirements. Connect trap primers to active water lines with unions and valves for isolation and replacement.
- N. All original building plumbing/steam pipes where originally insulated with asbestos. Work performed on these pipes shall be conducted in compliance with all applicable State & Federal requirements.
- O. Backflow prevention devices shall be installed in an accessible location, 5 (five) feet above finish floor. Register all backflow preventers with the DEP and Boston Water & Sewer Commission prior to the start of construction. Contractor shall be present during initial inspection and testing, and submit all necessary documentation and as-built drawings. Contractor shall furnish the VA with one (1) additional backflow re-build kit and filter for each device installed.

3.3 LEAK TESTING

- A. Test system either in its entirety or in sections. Test hot systems at design maximum temperature.
- B. Tests as approved by the Resident Engineer. Factory tested equipment (convertors, exchangers, coils, etc.) need not be field tested. Avoid excessive pressure on mechanical seals and safety devices. Inspect all joints and connections for leaks and workmanship and make corrections as necessary, to the satisfaction of the Resident Engineer. System shall be tight at all joints with no loss in test pressure.
- C. Test after installation of piping and domestic water heaters, but before piping is concealed, before covering is applied, and before plumbing fixtures are connected. Provide a pressure gage with a shutoff and bleeder valve at the highest point of the piping being tested.
- D. Soil, Waste and Vent Systems: Conduct before trenches are backfilled or fixtures are connected. Conduct water test or air test as directed by the Resident Engineer.
 - 1. Water Test: If entire system is tested, tightly close all openings in pipes except highest opening, and fill system with water to point of overflow. If system is tested in sections, tightly plug each opening except highest opening of section under test, fill each section with water and test with at least a 3 m (10 foot) head of water. In testing successive sections, test at least upper 3 m (10 feet) of next preceding section so that each joint or pipe except upper most 3 m (10 feet) of system has been submitted to a test of at least a 3 m (10 foot) head of water. Keep water in system, or in portion under test, for at least 15 minutes before inspection starts.
 - 2. Air Test: Maintain air pressure of 35 kPag (5 psig) for at least 15 minutes. Use force pump and calibrated mercury column gage.
 - 3. Verifying Accuracy of Low-Pressure Gages: Using a U-tube of mercury one end of the open U-tube is connected to the gage by a tube containing a valve for the injection of air. Air pumped into the connecting tube causes the mercury to stand at different levels in each arm of the U-tube. Each 2 inches of differential between the mercury-column levels represents a pressure of approximately 1 psig. A differential of 10.17 inches of mercury should register on the gage as 5 psig. A transparent plastic tube several feet long attached to an analog gage and filled with water provides a means of an accurate check of low pressures. Each vertical foot of water in the tube above the level of the gage exerts a pressure of 0.43 psig. Thus, if the tube is held so that the water level is 5 ft above the gage, the gage should read slightly more than 2 psig.
 - 4. Final Tests: One of the following tests shall be used.

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- a. Smoke Test: After fixtures are permanently connected and traps are filled with water, fill entire drainage and vent systems with smoke under pressure of 1.3 kPa (1 inch of water) with a smoke machine. Chemical smoke is prohibited.
 - b. Peppermint Test: Introduce (two ounces) of peppermint into each line or stack.
- E. All Other Piping Tests: Fill systems with water and maintain hydrostatic pressure at 1.5 times design pressure or 2.0 times actual maximum operating conditions (minimum 690 kPag - 100 psig) for minimum 2 hour duration. For water systems the design maximum pressure would usually be the static head or expansion tank maximum pressure plus pump head.

3.4 FLUSHING AND STERILIZATION

- A. After tests have been successfully completed, thoroughly flush and sterilize the interior domestic water distribution system in accordance with AWWA C651.
1. Initial Flushing: Flush all new/existing pipes. Remove loose dirt, mill scale, metal chips, weld beads, rust, and like deleterious substances without damage to any system component. Provide temporary piping or hose to bypass factory cleaned equipment unless acceptable means of protection are provided and subsequent inspection of hide out areas takes place. Isolate or protect clean system components, and remove any component that may be damaged. Open all valves, drains, vents and strainers at all system levels. Remove plugs, caps, spool pieces, and components to facilitate early debris discharge from system. Sectionalize system to obtain debris carrying velocity of 6 feet per second, if possible. Connect dead end supply and return headers as necessary. Flush bottoms of risers. Install temporary strainers where necessary to protect down stream equipment. Supply and remove flushing water and drainage by various type hoses, temporary and permanent piping and Contractor's booster pumps. Purge piping system until clean as approved by the Resident Engineer to flush construction materials from system.
 2. Cleaning: Utilizing compatible products in the system, circulate systems at normal temperature to remove adherent organic soil, hydrocarbons, flux, pipe mill varnish, pipe joint compounds, iron oxide, and like deleterious substances not removed by flushing, without chemical or mechanical damage to any system component. Removal of tightly adherent mill scale is not required. Keep isolated equipment which is "clean" and where dead end debris accumulation cannot occur. Sectionalize system if possible, to circulate at velocities not less than 6 feet per second. Circulate each section as approved by the Resident Engineer. Drain and prepare for final sterilization.
- B. Use either liquid chlorine or hypochlorite for sterilization.

3.5 IDENTITY LABELING

- A. Services: Identify systems (Examples: HW, CW, HWR; Hot Water, Cold Water, Hot Water Return) conforming to ANSI A13.1 in width and placement of color band, size and color of legend, unless specified otherwise, on piping, exposed, above removable ceilings, in accessible pipe spaces, interstitial spaces, and behind access panels.
1. Legend shall be pressure sensitive vinyl markers or stencil applied (painted on). Legends shall be placed to be clearly visible from operating position. Use arrow to indicate direction of flow.
 2. Place legends 8 feet apart on straight runs of piping, where pipes pass through walls or floors, and adjacent to all operating accessories such as valves, regulators, strainers and cleanouts.
 3. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard.
 4. Legend shall give name in full or in approved abbreviated form.

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- B. Equipment: Shall be labeled with engraved black phenolic plates for name and source of energy utilizing the hospital nomenclature as directed by the VA Project Engineer.

3.6 FIELD INSPECTIONS, OPERATING AND PERFORMANCE TESTS

- A. Verify type, quantity, location, operation of devices. Examples: Dielectric Fittings, Unions, Valves, Measuring Devices, Strainers.
- B. Perform applicable pressure tests for each system.
- C. Verify size, type, connectivity, pitch of system sections.
- D. Verify that the piping system has been flushed, cleaned and filled.
- E. Verify application of the system color code and labeling requirements.
- F. Verify compliance with the pipe support/restraint and accessories requirements.
- G. Replace disposable start-up strainers after several days of operation with regular strainers.
- H. Adjust red set hand on pressure gages to normal working pressure.
- I. Refer to PART 3 of Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

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SECTION 22 13 00
FACILITY SANITARY AND VENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

This section pertains to sanitary sewer and vent systems, including piping, equipment and all necessary accessories as designated in this section.

1.2 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING: Penetrations in rated enclosures.
- B. Section 09 91 00, PAINTING: Preparation and finish painting and identification of piping systems.
- C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING: Pipe Hangers and Supports, Materials Identification.
- D. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION: Pipe Insulation.
- E. Section 07 92 00 Joint Sealants: Sealant products.

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. Piping.
 - 2. Traps.
 - 3. Cleanouts.
 - 4. All items listed in Part 2 - Products.
- C. Detailed shop drawing of clamping device and extensions when required in connection with the waterproofing membrane or the floor drain.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME): (Copyrighted Society)
 - A112.6.3-01 (R 2007) Standard for Floor and Trench Drains
 - A13.1-07 Scheme for Identification of Piping Systems
 - B16.3-06 Malleable Iron Threaded Fittings, Classes 150 and 300.
 - B16.4-06 Standard for Grey Iron Threaded Fittings Classes 125 and 250
 - B16.12-98 (R 2006) Cast Iron Threaded Drainage Fittings
 - B16.15-06 Cast Bronze Threaded Fittings, Classes 125 and 250

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- C. American Society for Testing and Materials (ASTM):
- A47/A47M-99 (R 2004).....Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process
 - A53/A53M-07.....Standard Specification for Pipe, Steel, Black And Hot-Dipped, Zinc-coated, Welded and Seamless
 - A74-06Standard Specification for Cast Iron Soil Pipe and Fittings
 - A183-03Standard Specification for Carbon Steel Track Bolts and Nuts
 - A536-84(R 2004)Standard Specification for Ductile Iron Castings
 - B32-08Standard Specification for Solder Metal
 - B75-02Standard Specification for Seamless Copper Tube
 - B306-02*Standard Specification for Copper Drainage Tube (DWV)*
 - B584-06aStandard Specification for Copper Alloy Sand Castings for General Applications
 - C564-03aStandard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
 - D2000-08.....Standard Classification System for Rubber Products in Automotive Applications
 - D2564-04E1Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
 - D2665-08.....*Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings*
- D. International Code Council:
- IPC-06.....International Plumbing Code
- E. Cast Iron Soil Pipe Institute (CISPI):
- 301-05Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
 - 310-04Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
- F. American Society of Sanitary Engineers (ASSE):
- 1018-01Trap Seal Primer Valves – Potable, Water Supplied
- G. Plumbing and Drainage Institute (PDI):
- PDI WH-201Water Hammer Arrestor

This section pertains to sanitary sewer and vent systems, including piping, equipment and all necessary accessories as designated in this section.

PART 2 - PRODUCTS

2.1 SANITARY WASTE, DRAIN, AND VENT PIPING

- A. Cast iron waste, drain, and vent pipe and fittings

1. Cast iron waste, drain, and vent pipe and fittings shall be used for the following applications:
 2. The material for all pipe and fittings shall be cast iron soil pipe and fittings and shall conform to the requirements of CISPI Standard 301, ASTM A-888, or ASTM A-74.
 3. Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions. Couplings for hubless joints shall conform to CISPI 310.
- B. Copper Tube, (DWV):
1. Copper DWV tube sanitary waste, drain and vent pipe may be used for piping above ground, except for urinal drains.
 2. The copper DWV tube shall be drainage type, drawn temper conforming to ASTM B306.
 3. The copper drainage fittings shall be cast copper or wrought copper conforming to ASME B16.23 or ASME 16.29.
 4. The joints shall be lead free, using a water flushable flux, and conforming to ASTM B32.

2.2 EXPOSED WASTE PIPING

- A. Full iron pipe size chrome plated brass piping shall be used in finished rooms for exposed waste piping connecting fixtures, casework, cabinets, equipment and reagent racks when not concealed by apron including those furnished by the Government or specified in other sections.
1. The Pipe shall meet Fed. Spec. WW-P-351, standard weight.
 2. The Fittings shall conform to ANSI B16.15, cast bronze threaded fittings with chrome finish, (125 and 250).
 3. Nipples shall conform to ASTM B 687, Chromium-plated.
 4. Unions shall be brass or bronze with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.
- B. In unfinished Rooms such as mechanical Rooms, chrome-plated brass piping is not required. The pipe materials specified under the paragraph "Sanitary Waste, Drain, and Vent Piping" can be used. The sanitary pipe in unfinished rooms shall be painted as specified in Section 09 91 00, PAINTING.

2.3 SPECIALTY PIPE FITTINGS

- A. Transition pipe couplings shall join piping with small differences in outside diameters or different materials. End connections shall be of the same size and compatible with the pipes being joined. The transition coupling shall be elastomeric, sleeve type reducing or transition pattern and include shear and corrosion resistant metal, tension band and tightening mechanism on each end. The transition coupling sleeve coupling shall be of the following material:
1. For cast iron soil pipes, the sleeve material shall be rubber conforming to ASTM C564.
- B. The dielectric fittings shall conform to ASSE 1079 with a pressure rating of 860 kPa (125 psig) at a minimum temperature of 82°C (180°F). The end connection shall be solder joint copper alloy and threaded ferrous.
- C. Dielectric flange insulating kits shall be of non conducting materials for field assembly of companion flanges with a pressure rating of 1035 kPa (150 psig). The gasket shall be neoprene or phenolic. The bolt sleeves shall be phenolic or polyethylene. The washers shall be phenolic with steel backing washers.
- D. The di-electric nipples shall be electroplated steel nipple complying with ASTM F 1545 with a pressure ratings of 2070 kPa (300 psig) at 107°C (225°F). The end connection shall be male threaded. The lining shall be inert and noncorrosive propylene.

2.4 CLEANOUTS

- A. Cleanouts shall be the same size as the pipe, up to 100 mm (4 inches); and not less than 100 mm (4 inches) for larger pipe. Cleanouts shall be easily accessible and shall be gastight and watertight. Minimum clearance of 600 mm (24 inches) shall be provided for clearing a clogged sanitary line.
- B. Cleanouts shall be provided at or near the base of the vertical stacks with the cleanout plug located approximately 600 mm (24 inches) above the floor. If there are no fixtures installed on the lowest floor, the cleanout shall be installed at the base of the stack. The cleanouts shall be extended to the wall access cover. Cleanout shall consist of sanitary tees. Nickel-bronze square frame and stainless steel cover with minimum opening of 150 by 150 mm (6 by 6 inches) shall be furnished at each wall cleanout. Where the piping is concealed, a fixture trap or a fixture with integral trap, readily removable without disturbing concealed pipe, shall be accepted as a cleanout equivalent providing the opening to be used as a cleanout opening is the size required.
- C. In horizontal runs above grade, cleanouts shall consist of cast brass tapered screw plug in fitting or caulked/hubless cast iron ferrule. Plain end (hubless) piping in interstitial space or above ceiling may use plain end (hubless) blind plug and clamp.

2.5 TRAPS

- A. Traps shall be provided on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and set screw escutcheons. Concealed traps may be rough cast brass or same material as pipe connected to. Slip joints are not permitted on sewer side of trap. Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture.

2.6 WATERPROOFING

- A. A sleeve flashing device shall be provided at points where pipes pass through membrane waterproofed floors or walls. The sleeve flashing device shall be manufactured, cast iron fitting with clamping device that forms a sleeve for the pipe floor penetration of the floor membrane. A galvanized steel pipe extension shall be included in the top of the fitting that will extend 50 mm (2 inches) above finished floor and galvanized steel pipe extension in the bottom of the fitting that will extend through the floor slab. A waterproof caulked joint shall be provided at the top hub.
- B. Walls: See detail shown on drawings.

PART 3 – EXECUTION

3.1 PIPE INSTALLATION

- A. The pipe installation shall comply with the requirements of the International Plumbing Code (IPC) and these specifications.
- B. Branch piping shall be installed for waste from the respective piping systems and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.
- C. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe shall be reamed to full size after cutting.
- D. All pipe runs shall be laid out to avoid interference with other work.
- E. The piping shall be installed above accessible ceilings where possible.

- F. The piping shall be installed to permit valve servicing or operation.
- G. Unless specifically indicated on the drawings, the minimum slope shall be 2% slope.
- H. The piping shall be installed free of sags and bends.
- I. Changes in direction for soil and waste drainage and vent piping shall be made using appropriate branches, bends and long sweep bends. Sanitary tees and short sweep quarter bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Long turn double wye branch and eighth bend fittings shall be used if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Proper size of standard increaser and reducers shall be used if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- J. Buried soil and waste drainage and vent piping shall be laid beginning at the low point of each system. Piping shall be installed true to grades and alignment indicated with unbroken continuity of invert. Hub ends shall be placed upstream. Required gaskets shall be installed according to manufacturer's written instruction for use of lubricants, cements, and other installation requirements.
- K. Cast iron piping shall be installed according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings"
- L. Aboveground copper tubing shall be installed according to CDA's "Copper Tube Handbook".

3.2 JOINT CONSTRUCTION

- A. Hubless or No-hub, cast iron piping shall be joined in accordance with CISPI's "Cast Iron Soil Pipe and fittings Handbook" for hubless piping coupling joints.
- B. For threaded joints, thread pipe and with tapered pipe threads according to ASME B1.20.1. The threads shall be cut full and clean using sharp disc cutters. Threaded pipe ends shall be reamed to remove burrs and restored to full pipe inside diameter. Pipe fittings and valves shall be joined as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is required by the pipe service.
 - 2. Pipe sections with damaged threads shall be replaced with new sections of pipe.
- C. Copper tube and fittings with soldered joints shall be joined according to ASTM B828. A water flushable, lead free flux conforming to ASTM B813 and a lead free alloy solder conforming to ASTM B32 shall be used.

3.3 SPECIALTY PIPE FITTINGS

- A. Transition coupling shall be installed at pipe joints with small differences in pipe outside diameters.
- B. Dielectric fittings shall be installed at connections of dissimilar metal piping and tubing.

3.4 PIPE HANGERS, SUPPORTS AND ACCESSORIES

- A. All piping shall be supported according to the International Plumbing Code (IPC), Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, and these specifications. Where conflicts arise between these the code and Section 22 05 11, the most restrictive or the requirement that specifies supports with highest loading or shortest spacing shall apply.
- B. Hangers, supports, rods inserts and accessories used for pipe supports shall be shop coated with zinc chromate primer paint. Electroplated cooper hanger rods, hangers and accessories may be used with copper tubing.

- C. Horizontal piping and tubing shall be supported within 300 mm (12 inches) of each fittings or coupling.
- D. Horizontal cast iron piping shall be supported with the following maximum horizontal spacing and minimum hanger rod diameters:
 - 1. 40 mm or DN40 to 50 mm or DN50 (NPS 1-1/2 inch to NPS 2 inch): 1500 mm (60 inches) with 10 mm (3/8 inch) rod.
 - 2. 80 mm or DN 80 (NPS 3 inch): 1500 mm (60 inches) with 13 mm (1/2 inch) rod.
 - 3. 100 mm or DN100 to 125 mm or DN125 (NPS 4 to NPS 5): 1500 mm (60 inches) with 16 mm (5/8 inch) rod.
 - 4. 150 mm or DN150 to 200 mm or DN200 (NPS 6 inch to NPS 8 inch): 1500 mm (60 inches) with 19 mm (3/4 inch) rod.
 - 5. 250 mm or DN250 to 300 mm or DN 300 (NPS 10 inch to NPS 12 inch): 1500 mm (60 inch) with 22 mm (7/8 inch) rod.
- E. Vertical piping and tubing shall be supported at the base, at each floor, and at intervals no greater than 4.57 m (15 feet).
- F. In addition to the requirements in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, floor, Wall and Ceiling Plates, Supports, Hangers shall have the following characteristics:
 - 1. Solid or split unplated cast iron.
 - 2. All plates shall be provided with set screws.
 - 3. Height adjustable clevis type pipe hangers.
 - 4. Adjustable floor rests and base flanges shall be steel.
 - 5. Hanger rods shall be low carbon steel, fully threaded or threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
 - 6. Riser clamps shall be malleable iron or steel.
 - 7. See Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, for requirements on insulated pipe protective shields at hanger supports.
- G. Miscellaneous materials shall be provided as specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories. If the vertical distance exceeds 6 m (20 feet) for cast iron pipe additional support shall be provided in the center of that span. All necessary auxiliary steel shall be provided to provide that support.
- H. Cast escutcheon with set screw shall be provided at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
- I. Penetrations:
 - 1. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, a fire stop shall be installed that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Clearances between raceways and openings shall be completely filled and sealed with the fire stopping materials.
 - 2. Water proofing: At floor penetrations, clearances shall be completely sealed around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.
- J. Piping shall conform to the following:

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1. Waste and Vent Drain to main stacks:

Pipe Size	Minimum Pitch
80 mm or DN 80 (3 inches) and smaller	2%
100 mm or DN 100 (4 inches) and larger	1%

3.5 TESTS

- A. Sanitary waste and drain systems shall be tested either in its entirety or in sections.
- B. Waste System tests shall be conducted before trenches are backfilled or fixtures are connected. A water test or air test shall be conducted, as directed.
1. If entire system is tested for a water test, tightly close all openings in pipes except highest opening, and fill system with water to point of overflow. If the waste system is tested in sections, tightly plug each opening except highest opening of section under test, fill each section with water and test with at least a 3 m (10 foot) head of water. In testing successive sections, test at least upper 3 m (10 feet) of next preceding section so that each joint or pipe except upper most 3 m (10 feet) of system has been submitted to a test of at least a 3 m (10 foot) head of water. Water shall be kept in the system, or in portion under test, for at least 15 minutes before inspection starts. System shall then be tight at all joints.
 2. For an air test, an air pressure of 35 kPa (5 psig) gage shall be maintained for at least 15 minutes without leakage. A force pump and mercury column gage shall be used for the air test.
 3. After installing all fixtures and equipment, open water supply so that all p-traps can be observed. For 15 minutes of operation, all p-traps shall be inspected for leaks and any leaks found shall be corrected.
 4. Final Tests: Either one of the following tests may be used.
 - a. Smoke Test: After fixtures are permanently connected and traps are filled with water, fill entire drainage and vent systems with smoke under pressure of 1.3 kPa (1 inch of water) with a smoke machine. Chemical smoke is prohibited.
 - b. Peppermint Test: Introduce (2 ounces) of peppermint into each line or stack.

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SECTION 22 40 00
PLUMBING FIXTURES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies the provisions for the furnishing, installing and finishing of plumbing fixtures, associated trim and fittings necessary to make a complete installation from wall or floor connections to rough piping, and certain accessories. Refer to the plans for more details.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 07 92 00, JOINT SEALANTS: Sealing between fixtures and other finish surfaces.
- B. Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

1.3 QUALITY ASSURANCE

Refer to specification Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data:
 - 1. All required items listed in Part 2 – Products.
 - 2. All fixtures shown on the plumbing schedule and drawings.
 - 3. Submit plumbing fixture information in an assembled brochure, showing cuts and full detailed description of each fixture.
- B. Operation and Maintenance Manuals: Submit in accordance with Article, INSTRUCTION MANUALS, in Section 01 00 00, GENERAL REQUIREMENTS.
- C. Certifications: Prior to the next Section of plumbing work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by a plumbing system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. American with Disabilities Act (ADA):
Section 4-19.4 Exposed Pipes and Surfaces

Appendix B.4.24 Sinks

- B. American National Standard Institute (ANSI):
The American Society of Mechanical Engineers (ASME):
A112.6.1M Supports for Off-the-Floor Plumbing Fixtures for Public Use
A112.19.3M Stainless Steel Plumbing Fixtures (Designed for Residential Use)
- C. American Society of Sanitary Engineers (ASSE):
1016 Performance Requirements for Individual Thermostatic, Pressure
Balancing and Combination Pressure Balancing and
Thermostatic Control Valves for Individual Fixture Fittings
- D. American Society for Testing and Materials (ASTM):
A276 Stainless and Heat-Resisting Steel Bars and Shapes
- E. National Association of Architectural Metal Manufacturers (NAAMM):
Metal Finishes Manual
- F. National Sanitation Foundation (NSF):
61 Drinking Water System Components-Health Effects

PART 2 – PRODUCTS

2.1 STAINLESS STEEL

- A. Corrosion-resistant Steel (CRS):
 - 1. Plate, Sheet and Strip: CRS flat products shall conform to chemical composition requirements of any 300 series steel specified in ASTM A276.
 - 2. Finish: Exposed surfaces shall have standard polish (ground and polished) equal to NAAMM finish Number 4.
- B. Die-cast zinc alloy products are prohibited.

2.2 STOPS

- A. Provide lock-shield loose key or screw driver pattern angle stops, straight stops integral with faucet, with each compression type faucet whether specifically called for or not, including sinks in wood and metal casework, laboratory furniture and pharmacy furniture. Locate stops centrally above or below fixture in accessible location.
- B. Furnish keys for lock shield stops to Resident Engineer.
- C. Supply from stops not integral with faucet shall be chrome plated copper flexible tubing.
- D. Supply pipe from wall to valve stop shall be rigid threaded IPS copper alloy pipe.
- E. Provide stainless steel drain guard for all lavatories not installed in casework.
- F. Provide cover for stops per A.D.A 4-19.4.

2.3 ESCHUTCHEONS

Heavy type, chrome plated, with set screws. Provide for piping serving plumbing fixtures and at each wall, ceiling and floor penetrations in exposed finished locations and within cabinets and millwork. Provide only in finished rooms. Mechanical rooms are not considered finished rooms.

2.4 LAMINAR FLOW CONTROL DEVICE

- A. Smooth, bright stainless steel or satin finish, chrome plated metal laminar flow device shall provide non-aeration, clear, coherent laminar flow that will not splash in basin. Device shall also have a flow control restrictor and have vandal resistant housing.
- B. Flow Control Restrictor:
 - 1. Capable of restricting flow from 1.5 to 1.7 GPM for lavatories (0.5 GPM for fixture P-405); 2.0 to 2.2 GPM for sinks, 2.75 to 3.0 GPM for rinse sinks.
 - 2. Compensates for pressure fluctuation maintaining flow rate specified above within 10 percent between 25 and 80 PSIG.
 - 3. Operates by expansion and contraction, eliminates mineral/sediment build-up with self clearing action, and is capable of easy manual cleaning.
- C. Device manufactured by OMNI Products, Inc. or equal, meeting the specified requirements is a measure of quality.

2.5 SINKS

- A. Dimensions for sinks and laundry tubs are specified, length by width (distance from wall) and depth.
- B. (DF-1) Drinking Fountain.
 - 1. Halsey Taylor HDFFBLREBP installed to suit ADA accessible requirements. Provide (2) ½ inch cold water supply riser with stop. (2) 1-1/2 inch brass p-trap and tailpiece to suit the installation.
 - 2. Drain: Drain plug(s) with cup strainer, stainless steel.
 - 3. Trap: (2) Cast copper alloy 40 mm (1-1/2 inch) P-trap with cleanout plug, wall connection and escutcheon.
- C. Refer to Drawings and Fixture Schedule for additional information.

2.6 MISCELLANEOUS DEVICES

Refer to Drawings and Fixture Schedule.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Fixture Setting: Opening between fixture and floor and wall finish shall be sealed as specified under Section 07 92 00, JOINT SEALANTS.
- B. Supports and Fastening: Secure all fixtures, equipment and trimmings to partitions, walls, etc. **Provide suitable blocking in hollow partitions and walls to support the weight of each fixture and miscellaneous items.** Exposed heads of bolts and nuts in finished rooms shall be hexagonal, polished chrome plated brass with rounded tops.
- C. Through Bolts: For free standing marble and metal stud partitions.
- D. Toggle Bolts: For hollow masonry units, finished or unfinished.
- E. Expansion Bolts: For brick or concrete or other solid masonry. Shall be 1/4-inch diameter bolts, 20 threads per inch, extend at least 3 inches into masonry; to be fitted with loose tubing or sleeves extending into masonry. Wood plugs, fiber plugs, lead or other soft metal shields are prohibited.

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- F. Power Set Fasteners: May be used for concrete walls, shall be 1/4-inch threaded studs, 20 threads per inch, and shall extend at least 1-1/4 inches into wall.
- G. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury.
- H. Do not use aerators on lavatories and sinks.

3.2 CLEANING

At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

3.3 FIELD INSPECTIONS, OPERATING AND PERFORMANCE TESTS

- A. Verify type, quantity, location, operation of devices.
- B. Verify application of the device labeling requirements.
- C. Verify operation of automatic air vents and trap primers.
- D. Verify tightness of accessible bolted connections with published data.
- E. Perform applicable tests required in accordance with manufacturer's recommendations'.
- F. Refer to PART 3 of Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS.

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SECTION 23 05 11
COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Basic methods and requirements for Division 23, MECHANICAL, apply to all sections of Division 22, 23.
- B. Furnish and install mechanical systems, equipment and accessories in accordance with the specifications and drawings.
- C. Verify in advance of performing any work the availability, type, capacity, location of mechanical systems necessary to perform the work.
- D. Definitions:
 - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms.
 - 2. Option or optional: Contractor's choice of an alternate material or method offered in documents.
 - 3. Shall: Mandatory.
 - 4. May: Optional.

1.2 RELATED WORK – MINIMUM WORK PERFORMANCE REQUIREMENTS

No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Verify all dimensions, clearances, information and assumptions on existing conditions. All work shall be performed within approved tolerances, meet the requirements of the manufacturer and be neat, straight, plumb, level, smooth. Contractor is responsible for reviewing all contract documents for discrepancies prior to commencing any and all work. Contractor shall notify the Project Engineer of any variances with adequate time so that alternate solutions can be established without disrupting the established construction schedule. Data and information furnished or referred to in the construction documents is for the Contractor's use. The Government assumes no responsibility for any interpretation of or conclusion drawn from the data or information made by the contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions that can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in the contract.
- B. Division 01, GENERAL REQUIREMENTS: Work performance.
- C. References to the APPLICABLE PUBLICATIONS are a minimum requirement standard. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. Drawings and specification sections shall govern in those instances where contract document requirements are greater than those specified in the APPLICABLE PUBLICATIONS

1.3 COORDINATION

Coordinate work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the

purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Coordinate the location of all work, equipment and components with other trades and equipment installers to prevent interferences, and maintain proper use and access to all items and spaces. Refer to the **"Coordination Drawing Checklist"** for further details. General Contractor is responsible for coordinating all equipment and components being installed with the placement location and dimension requirements. Prior to job execution each trade shall submit "complete" coordinated shop drawings indicating all equipment and material layouts with locations from walls/columns, bottom/top elevations, vibration isolators, supports, dimensions, utility requirements and equipment submittal numbers. Each trade shall maintain a set of working drawings to document as-built information as the work progresses and submit to the Project Engineer monthly for review.
- B. All work shall be coordinated with other trades to avoid conflicts and to obtain a neat competent installation that will afford maximum accessibility for easy and proper operation, maintenance, service and headroom. All work shall be installed in a manner that permits easy accessibility and proper removal of system components requiring periodic service. Any items determined to be in non-compliance shall be corrected by the Contractor at no additional expense to the Government.
- C. The drawings show or describe the general arrangement of equipment, articles, assemblies, appurtenances but do not show all required fittings, drains, air vents, supports and may not identify all required accessories, components, fittings, and offsets that are necessary to properly complete the installation for the purpose intended. The contract drawings are diagrammatic only intended to show general layout of conduit, ductwork, piping, equipment, terminals, specialties and not intended to show all required offsets, details, accessories and equipment to be connected. Provide all necessary fittings, offsets and pipe runs based on field measurements and reviewed coordination drawings. Coordinate with other trades for space available and relative location of equipment and accessories to be connected at all locations. The Contractor shall alter locations of items where necessary to avoid interference and clearance difficulties. Locations of components and equipment shall be adjusted to accommodate the work with interferences anticipated and encountered. The Contractor shall determine the exact routing and location of systems prior to fabrication and installation. Accurate field measurements and coordination drawings shall be prepared to establish the locations and characteristics of the various systems (new and existing to remain). It is the intent of the drawings/specifications that the Contractor provides **all** materials, labor and coordination necessary to complete the work described or implied by the contract documents at no additional cost/time to the Government. The Contractor shall propose with submitted coordination drawings other dimensions with similar characteristics where necessary to avoid interferences and clearance difficulties. **Should the contract documents not agree with themselves the greater quantity of superior work and materials shall be performed.**
- D. Coordinate all mechanical (eg, HVAC), electrical, plumbing (MEP) utility service, fire protection sprinkler system shutdowns and space access three (3) weeks in advance with the Project Engineer. Due to facility scheduling and access difficulties, some shutdowns and the performance of certain work will need to be performed during prime-time by the Contractor. Arrange phases and perform work to insure utility services for other buildings and areas at all times as required.

1.4 QUALITY ASSURANCE

- A. Independent Mechanical System Inspection/Testing Organization:
 - 1. Agency that is financially independent of equipment manufacturer, supplier, and installer. Inspection/Testing of the entire mechanical system shall be performed by an independent agency regularly involved in the specified work.

2. Certification: Documentation upon completion of inspection/testing to include results, names of independent agency individuals performing work, detailed procedures followed for inspection/testing, and certification that all results were within the limits specified.
- B. When Factory Testing Is Specified:
1. The Government shall have the option of witnessing factory tests. Contractor shall notify the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 2. Four (4) copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
 3. When equipment fails to meet factory test and re-inspection is required, the Contractor shall be liable for all additional expenses, including expenses of the Government.
- C. Products and associated systems shall be safe, reliable, efficient, durable, easily and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified. All construction firms and personnel shall be experienced and qualified specialists in the applicable industrial and institutional construction.
- D. Product Criteria:
1. Materials, equipment and associated systems shall be comprised of high quality industrial-class and institutional-class products of current production by manufacturers that are experienced specialists in the required products.
 2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly. Asbestos products, or equipment or materials containing asbestos shall not be used.
 3. Products and systems shall be supported by service organizations that maintain a complete inventory of repair parts and are located reasonably close to the site.
 4. When more than one unit of the same class of product is required, such units shall be the products of a single manufacturer.
 5. Brand Names: Certain items may be identified by brand name make and model. Identification of these items by a "brand name" description is intended to indicate the quality and salient (physical, functional, or performance) characteristics of products that will be satisfactory and is not intended to be restrictive. Unless clearly indicated in the offer that an "equal" product is offered, the offer shall be considered as offering a referenced brand name product. Offers of "equal" products or items will be considered for this award if such product or item is clearly identified in the offer and is determined by the Government to fully meet the salient (physical, functional, or performance) characteristics of the product or item named. The Government's determination as to the acceptability of the "equal" product shall be based on information furnished or otherwise identified in the offer, as well as other information reasonably available to the Government. If the item cited is no longer available, the manufacturer's currently available item that replaces the cited model shall be provided.
- E. Assemblies and Components:
1. Manufacturers of assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 2. Components shall be compatible with each other and with the total assembly for the intended service.
 3. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

4. Components of an assembled unit need not be products of the same manufacturer.
 5. Constituent parts that are similar shall be the product of a single manufacturer.
 - F. **Manufacturer's Recommendations:** Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Resident Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.
 - G. **HVAC Systems:** ASHRAE; SMACNA; Massachusetts Building & Mechanical/Plumbing Code.
- 1.5 **SUBMITTALS**
- In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, furnish the following:
- A. **Manufacturer's Literature and Data:** Submit under the pertinent specification section.
 1. Equipment, components and materials shown on drawings and/or identified.
- 1.6 **PRODUCT DELIVERY, STORAGE AND HANDLING**
- A. **Delivery:** Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.
 - B. **Protection:** Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, rain and cold.
 1. Equipment and material placed on the job site shall remain in the custody of the Contractor until acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
 2. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or equal. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.
 3. Damaged equipment shall be replaced or repaired to original operating condition as determined and directed by the Resident Engineer. Such repair or replacement shall be at no additional cost to the Government.
 4. Existing equipment and systems being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected against any damage.
 - C. **Cleaning:**
 1. Enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing, operating and painting.
 2. Prior to final inspection and acceptance of the facilities and areas for beneficial use by the Government, the equipment and systems shall be thoroughly cleaned and painted.
 3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.
 4. In addition, the following special conditions apply:
 - a. Cleaning shall be thorough. Use cleaning materials and methods recommended by the manufacturers for the specific tasks. Remove all rust prior to painting and

from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.

- b. Control and instrument panels shall be cleaned; damaged surfaces repaired, and touched-up with matching paint obtained from panel manufacturer.
- c. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment if necessary to achieve proper finish.

PART 2 – PRODUCTS

2.1 ASSEMBLED PRODUCTS

- A. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

PART 3 – EXECUTION

3.1 GENERAL

- A. Proper precautions shall be taken so that adjacent occupied areas shall not be disturbed or contaminated during construction. The VA Project Engineer shall be consulted three (3) weeks in advance for approval of work schedules in occupied areas. Due to hospital scheduling and access difficulties some work will likely require prime-time performance by the Contractor. Work above ceilings in areas beyond the construction boundary shall be cleaned and closed with matching undamaged materials by the close of each day.
- B. Verify in advance of performing any work the availability, type, capacity, location of energy systems (eg, Mechanical, Electrical, Plumbing) necessary to perform the work. Provide all necessary labor, material and coordination to complete the work described or implied by the construction documents for equipment to operate in the manner intended at no additional cost or time to the Government. In the event that the characteristics of any equipment do not agree with the characteristics of the available system, make the necessary modifications. All appurtenances, assemblies, articles, equipment, components, and materials furnished shall be new and free from defects, and be of the most suitable grade, size and capacity for the purpose intended, unless otherwise specified or approved by the VA Project Engineer. **Should the contract documents not agree with themselves the greater quantity of superior quality materials and work shall be used.**
- C. All appurtenances, assemblies, articles, equipment, components, and materials installed shall be complete for operation, service and maintenance for the purpose intended not limited to the details and information provided. All appurtenances, assemblies, articles, equipment, components, materials and execution shall be in conformance with the contract documents, manufacturer's written procedures and recommendations, latest editions of all applicable Federal/State/City codes, regulations, ordinances, and the jurisdiction having authority (JHA) as applicable. Except where specific dates are given, the issue (including amendments, addenda, revisions, supplements, and errata) in effect on the date of Invitation for Bids shall be applicable. **In the event that criteria requirements conflict, the most stringent requirement (the greater quantity of superior quality materials and work) shall be met.**

- D. Construction shall not block proper access to new/existing appurtenances, assemblies, articles, equipment, components, and materials requiring operation, service and maintenance whether detailed on the drawings or not. Access must be conveniently placed as determined by the VA Project Engineer.
- E. Properly relocate any existing systems (including but not limited to plumbing/steam lines, ducts, pipes, conduits, hangers, fixtures, surface mounted devices, suspension systems) considered interfering with the installation of new construction at no additional expense to the Government, and after confirming plans with the VA Project Engineer. This will include the relocation and/or reinstallation of items within the construction boundaries to perform and complete all necessary work as required.
- F. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to original condition. Care shall be used during removal and installation to avoid damaging the surrounding surfaces. Damaged surfaces and items within the contract limits shall be patched, repaired, refinished, painted and/or replaced as necessary with materials comparable to the surrounding material and surface equal to new conditions unless otherwise noted or directed by the VA Project Engineer. Finished surfaces shall be indistinguishable from the surrounding area.
- G. All installed equipment shall be labeled with name and source of energy utilizing the facility nomenclature as directed by the VA Project Engineer. Energy systems (eg, Mechanical, Electrical and Plumbing) shall be color code labeled with contents and flow direction in 8 foot intervals.
- H. All original building plumbing/steam pipes are insulated with asbestos. Work performed on these pipes will be coordinated with other trades and conducted in compliance with all applicable State & Federal requirements.
- I. Trace "all" systems (new, existing), verify designations, and provide new directories and VA supplied system schedules for all new and existing systems within the construction boundary. Maintain the documented conditions during installation and verify at the completion of construction.
- J. Utilize pipe freeze technology as specified by Freeze Seal Engineering (New Castle, DE) for attaching new work to existing building systems in the likely event that building utilities cannot be shut down.

3.2 INSTALLATION

- A. In the event that criteria requirements conflict, the most stringent requirement (the greater quantity of superior work and materials) shall be met.
- B. Coordinate location of equipment, components, materials and articles with other trades. Locate equipment, components, materials and articles clear of proper operation and service to other equipment, components, materials and articles (eg, windows, doors, openings, lights, outlets), and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- C. Construction shall not block proper access to new/existing materials, equipment, components, articles, assemblies, appurtenances requiring operation, service and maintenance **whether detailed on the drawings or not**. Access must be conveniently placed as determined by the VA Project Engineer.

3.3 INSPECTIONS, OPERATING AND PERFORMANCE TESTS

- A. Schedule and perform all required inspections and tests for each system as required by the manufacturers and specified in the contract documents. Conduct inspections and tests required in various Sections of specifications in presence of an authorized representative (Resident Engineer – COTR) of the Contracting Officer scheduled two (2) weeks in advance.

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- B. Within one (1) week after completion of each phase of work in each applicable Section, submit to the Resident Engineer 4 copies of each inspection/testing report tabulating the results, analysis, recommendations documenting that all work performed including material/installation is in compliance with all the applicable manufacturers' requirements, codes and contract requirements. Inspections, tests or similar services shall be performed and certified by qualified mechanical system specialists from an independent agency.
- C. Test instruments, materials, labor to be supplied by the testing agency (an independent certified testing company) furnished by the Contractor.

--- E N D ---

SECTION 23 05 93
TESTING, ADJUSTING, BALANCING FOR HVAC

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies the provisions for the testing, adjusting, and balancing (TAB) of heating, ventilating and air conditioning (HVAC) systems.
- B. TAB includes the following:
 - 1. Design Review Report.
 - 2. Systems Readiness Report.
 - 3. Planning systematic TAB procedures.
 - 4. Systems Inspection report for conformance with design.
 - 5. Balancing air distribution systems; adjustment of total system to provide design performance.
 - 6. Recording and reporting all results.
- C. Terminology:
 - 1. Basic TAB used in this Section: Chapter 36, "Testing, Adjusting and Balancing" of ASHRAE Handbook, "HVAC Applications".
 - 2. TAB: Testing, Adjusting and Balancing ... The process of checking and adjusting HVAC systems to meet design objectives.
 - 3. AABC: Associated Air Balance Council.
 - 4. NEBB: National Environmental Balancing Bureau.
 - 5. Hydronic Systems: Includes chilled water, and condenser water.
 - 6. Air Systems: Includes all outside air, supply air, return air, exhaust air and relief air systems.
 - 7. Flow rate tolerance: The allowable percentage variation, minus to plus, of actual flow rate from values (design) in the contract documents.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

1.3 QUALITY ASSURANCE

- A. TAB Qualifications:
 - 1. TAB Agency: The TAB agency shall be a subcontractor of the General Contractor and shall report to and be paid by the General Contractor.
 - 2. TAB agency shall be either a certified member of AABC or certified by the NEBB to perform TAB service for HVAC air, water balancing and vibrations and sound testing of equipment. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the agency loses subject certification during this period, the

General Contractor shall immediately notify the Resident Engineer and submit another TAB firm for approval. Any agency that has been the subject of disciplinary action by either the AABC or the NEBB within the five years preceding Contract Award shall not be eligible to perform any work related to the TAB. All work performed in this Section and in other related Sections by the TAB agency shall be considered invalid if the TAB agency loses its certification prior to Contract completion, and the successor agency's review shows unsatisfactory work performed by the predecessor agency.

3. TAB Specialist: The TAB Specialist shall be either a member of AABC or an experienced technician of the Agency certified by NEBB. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the Specialist loses subject certification during this period, the General Contractor shall immediately notify the Resident Engineer and submit another TAB Specialist for approval. Any individual that has been the subject of disciplinary action by either the AABC or the NEBB within the five years preceding contract award shall not be eligible to perform any duties related to the HVAC systems, including TAB. All work specified in this Section and in other related Sections performed by the TAB specialist shall be considered invalid if the TAB Specialist loses its certification prior to contract completion and must be performed by an approved successor.
 4. TAB Specialist Responsibilities:
 - a. The General Contractor within 60 days after the notice to proceed shall identify TAB Specialist who shall be responsible for supervising, coordinating, scheduling and reporting all TAB work and related activities and provide necessary information as required by the Resident Engineer.
 - b. TAB Specialist will be coordinating, scheduling and reporting all TAB work and related activities and shall provide necessary information as required by the Resident Engineer. The TAB Specialist shall follow all TAB work through its satisfactory completion and directly supervise all TAB work.
 - c. Final markings of settings of all HVAC adjustment devices.
 - d. Permanently mark location of duct test ports.
 - e. TAB Specialist shall sign the TAB reports that bear the seal of the TAB standard. The reports shall be accompanied by report forms and schematic drawings required by the TAB standard, AABC or NEBB.
 5. All TAB technicians performing actual TAB work shall be experienced and must have done satisfactory work on a minimum of 3 projects comparable in size and complexity to this project. Qualifications must be certified by the TAB agency in writing.
- B. Test Equipment Criteria: The test equipment/instruments shall meet the accuracy/calibration requirements established by AABC National Standards or by NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, and the instrument manufacturer. Provide calibration history of the instruments to be used for TAB.
- C. TAB Criteria:
1. Take a sufficient quantity of readings that will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until two (2) consecutive identical values are obtained.
 2. One or more of the applicable AABC or NEBB publications, supplemented by SMACNA and ASHRAE Handbook "HVAC Applications" Chapter 36, shall be the basis for planning, procedures, and reports.

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3. Flow rate tolerance: Values are based on discussion in ASHRAE Handbook "HVAC Applications", Chapter 36. Air filter resistance during tests, artificially imposed if necessary, shall be at least 90 percent of final values for pre-filters and after-filters.
 - a. Air terminal units (Max): Minus 5 percent to plus 10 percent.
 4. Systems shall be adjusted for energy efficient operation as described in PART 3.
 5. Typical TAB procedures and results shall be demonstrated to the Resident Engineer for the air distribution (including all fans), steam and hydronic systems as follows:
 - a. When field TAB work begins.
 - b. During each partial final inspection and the final inspection for the project.
- D. Minimum Required Reporting:
1. Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Test conditions
 2. Return Air:
 - a. Identification/location
 - b. Design air flow
 - c. Actual air flow
 3. Exhaust Fan:
 - a. Manufacturer
 - b. Model/Serial number
 - c. Location
 - d. Air flow, specified and actual

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 23 05 11, REQUIREMENTS FOR MECHANICAL INSTALLATIONS, furnish the following:

- A. TAB Agency:
1. Submit names and qualifications of TAB agency officers, job supervisor and TAB Specialists within 60 days after the notice to proceed.
 2. Submit information on TAB Specialists' three recently completed projects.
 3. Submit list of proposed test equipment.
- B. Cleaning Agency Qualifications: Submit names and qualifications of company officers and job supervisor. Submit information on three recently completed projects. Submit list of proposed test equipment.
- C. Submit one complete set of applicable AABC or NEBB publications that will be the basis of TAB work for use by the Resident Engineer.
- D. Submit for Review and Approval:
1. Design Review Report within 60 days after the system layout on air and water side is completed by the Contractor.

2. Systems inspection report on equipment and installation for conformance with design and contract documents. This report is to be submitted during early stages of the project in order to allow timely correction of deficiencies.
 3. Intermediate and Final TAB reports covering flow balance and adjustments, performance tests, vibration tests, and sound tests. These reports shall be submitted prior to or at the time of requesting final inspection or partial final inspections of contract work.
 4. Include in final reports uncorrected installation deficiencies noted during TAB and applicable explanatory comments on test results that differ from design requirements.
- E. Prior to request for Final or Partial Final inspection, submit completed Test and Balance report for the area.
- F. Certifications: When appropriate and **well in advance of beneficial occupancy**, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Certification shall be performed by a registered professional Mechanical Engineer, inspection shall be performed by a mechanical system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):
HVAC Applications Ch 37 Testing, Adjusting, and Balancing
HVAC Applications Ch 47 Sound and Vibration Control
Standard 111 Practices for Measurement, Testing, Adjusting, and Balancing
of Building Heating, Ventilation, Air-conditioning, and
Refrigeration Systems
- B. Associated Air Balance Council (AABC):
AABC National Standards for Total System Balance
- C. National Air Duct Cleaners Association (NADCA)
1992 Assessment, Cleaning, and Restoration of HVAC Systems
ACR-2002 Assessment, Cleaning, and Restoration of HVAC Systems
- D. National Environmental Balancing Bureau (NEBB):
Procedural Standards for Testing, Adjusting, Balancing of Environmental System
Procedural Standards for the Measurement and Assessment of Sound and Vibration
Procedural Standards for Building Systems Commissioning
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
HVAC SYSTEMS - Testing, Adjusting and Balancing

PART 2 – PRODUCTS

2.1 PLUGS

Provide plastic plugs with gasket to seal holes drilled in ductwork for test purposes to prevent air leakage.

2.2 MATERIALS

Replacement of additional balancing dampers, pressure taps and fitting, any other devices or equipment required to effect proper testing, adjusting and balancing shall be provided by the Contractor at no additional cost to the Government.

PART 3 – EXECUTION

3.1 GENERAL

- A. Refer to TAB Criteria in Article, Quality Assurance.
- B. Obtain applicable contract documents and copies of approved submittals for HVAC equipment and automatic control systems.
- C. Allow sufficient time in construction schedule for TAB and submission of all reports for an organized and timely correction of deficiencies.
- D. Coordinate TAB procedures with any phased construction completion requirements for the project. Systems serving completed phases of the project will require TAB for such phases prior to partial final inspections and for final phase inspection. Provide TAB reports for each phase of the project prior to partial final inspections of each phase of the project.

3.2 DESIGN REVIEW REPORT

TAB Specialist shall review the Contract Plans and specifications and advise the Resident Engineer of any design deficiencies that would prevent the HVAC systems from effectively operating in accordance with the sequence of operation specified or prevent the effective and accurate TAB of the system. TAB Specialist shall provide a report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation.

3.3 SYSTEMS INSPECTION REPORT

- A. Inspect equipment and installation for conformance with design. The inspection and report is to be done after air distribution equipment is on site and duct installation has begun, but well in advance of performance testing and balancing work.
- B. The purpose of the inspection is to identify and report deviations from design and ensure that systems will be ready for TAB at the appropriate time.
 - 1. Verify that systems are complete and operable before commencing work.
- C. Reports: Follow check list format developed by AABC, NEBB or SMACNA, supplemented by narrative comments, with emphasis on air handling units and fans. Check for conformance with submittals. Verify that diffuser and register sizes are correct. Check air terminal unit installation including duct sizes and routing devices. TAB Specialist shall provide a report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation.

3.4 TAB REPORTS

- A. Submit an intermediate report for 50 percent of systems and equipment tested and balanced to establish satisfactory test results.
- B. The TAB contractor shall provide raw data immediately in writing to the Resident Engineer if there is a problem in achieving intended results before submitting a formal report.
- C. If over 20 percent of readings in the intermediate report fall outside the acceptable range, the TAB report shall be considered invalid and all contract TAB work shall be repeated and re-submitted for approval.
- D. Do not proceed with the remaining systems until intermediate report is approved by the Resident Engineer.

--- E N D ---

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Air Outlets and Inlets: Diffusers, Registers, and Grilles.

1.2 RELATED WORK

- A. Testing and Balancing of Air Flows: Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.

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. Diffusers, registers, grilles and accessories.

1.4 APPLICABLE APPLICATIONS

- 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. Air Diffusion Council Test Code:

1062 GRD-84.....Certification, Rating, and Test Manual 4th Edition

- C. American Society of Civil Engineers (ASCE):

ASCE7-05.....Minimum Design Loads for Buildings and Other Structures

- D. American Society for Testing and Materials (ASTM):

A167-99 (2004).....Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

B209-07Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

- E. National Fire Protection Association (NFPA):

90A-09Standard for the Installation of Air Conditioning and Ventilating Systems

- F. Underwriters Laboratories, Inc. (UL):

181-08.....UL Standard for Safety Factory-Made Air Ducts and Connectors

PART 2 - PRODUCTS

2.1 AIR OUTLETS AND INLETS

- A. Materials:

- 1. Aluminum. Use aluminum air outlets and inlets for facilities located in high-humidity areas.

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2. Exposed Fastenings: The same material as the respective inlet or outlet. Fasteners for aluminum may be stainless steel.
3. Contractor shall review all ceiling drawings and details and provide all ceiling mounted devices with appropriate dimensions and trim for the specific locations.
- B. Performance Test Data: In accordance with Air Diffusion Council Code 1062GRD. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT for NC criteria.
- C. Air Supply Outlets:
 1. Ceiling Diffusers: Suitable for surface mounting, exposed T-bar or special tile ceilings, off-white finish, square or round neck connection as shown on the drawings. Provide plaster frame for units in plaster ceilings.
 - a. Square, louver, fully adjustable pattern: Round neck, surface mounting unless shown otherwise on the drawings. Provide equalizing or control grid and volume control damper.
 - b. Louver face type: Square or rectangular, removable core for 1, 2, 3, or 4 way directional pattern. Provide equalizing or control grid and opposed blade damper.
- D. Return and Exhaust Registers and Grilles: Provide opposed blade damper without removable key operator for registers.
 1. Finish: Off-white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting, or shall be extruded aluminum with manufacturer's standard aluminum finish.
 2. Standard Type: Fixed horizontal face bars set at 30 to 45 degrees, approximately 30 mm (1-1/4 inch) margin.
 3. Grid Core Type: 13 mm by 13 mm (1/2 inch by 1/2 inch) core with 30 mm (1-1/4 inch) margin.

2.2 FILTER RETURN/EXHAUST GRILLE

- A. Provide grille with in stream 1-inch deep MERV 4 filter and removable face.
 1. Finish: Off-white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting, or shall be extruded aluminum with manufacturer's standard aluminum finish. Stainless Steel shall be No. 4 finish.
 2. Standard Type: Fixed horizontal face bars set at 30 to 45 degrees, approximately 30 mm (1-1/4 inch) margin.
 3. Steel, Aluminum, or Stainless steel as scheduled.
 4. Standard face connected to a mounting frame with space for a throwaway filter. Hold face closed by a locking screw. Provide retaining clips to hold filter in place. Provide fiberglass throwaway filter.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with provisions of Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION, particularly regarding coordination with other trades and work in existing buildings.
- B. Protection and Cleaning: Protect equipment and materials against physical damage. Place equipment in first class operating condition, or return to source of supply for repair or

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replacement, as determined by Resident Engineer. Protect equipment during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting.

3.2 TESTING, ADJUSTING AND BALANCING (TAB)

- A. Refer to Section 23 05 93, TESTING, ADJUSTING AND BALANCING FOR HVAC.

--- E N D ---

SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Basic methods and requirements for Division 26, ELECTRICAL, apply to all sections of Division 26, 27, 28.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings.
- C. Verify in advance of performing any work the availability, type, capacity, location of electrical systems necessary to perform the work.
- D. Ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.
- E. Definitions:
 - 1. Exposed: Items exposed to view in finished rooms.
 - 2. Option or optional: Contractor's choice of an alternate material or method offered in documents.
 - 3. Shall: Mandatory.
 - 4. May: Optional.

1.2 RELATED WORK – MINIMUM WORK PERFORMANCE REQUIREMENTS

No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Verify all dimensions, clearances, information and assumptions on existing conditions. All work shall be performed within approved tolerances, meet the requirements of the manufacturer and be neat, straight, plumb, level, smooth. Contractor is responsible for reviewing all contract documents for discrepancies prior to commencing any and all work. Contractor shall notify the Project Engineer of any variances with adequate time so that alternate solutions can be established without disrupting the established construction schedule. Data and information furnished or referred to in the construction documents is for the Contractor's use. The Government assumes no responsibility for any interpretation of or conclusion drawn from the data or information made by the contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions that can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in the contract.
- B. Division 01, GENERAL REQUIREMENTS: Work performance.
- C. References to the APPLICABLE PUBLICATIONS are a minimum requirement standard. Except where a specific date is given, the issue in effect including amendments, addenda, revisions, supplements, and errata on the date of Invitation for Bids shall be applicable. Drawings and specification sections shall govern in those instances where contract document requirements are greater than those specified in the APPLICABLE PUBLICATIONS.

1.3 COORDINATION

Coordinate work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended.

- A. Coordinate the location of all work, equipment and components with other trades and equipment installers to prevent interferences, and maintain proper use and access to all items and spaces. Refer to the **"Coordination Drawing Checklist"** for further details. General Contractor is responsible for coordinating all equipment and components being installed with the placement location and dimension requirements. Prior to job execution each trade shall submit "complete" coordinated shop drawings indicating all equipment and material layouts with locations from walls/columns, bottom/top elevations, vibration isolators, supports, dimensions, utility requirements and equipment submittal numbers. Each trade shall maintain a set of working drawings to document as-built information as the work progresses and submit to the Project Engineer monthly for review.
- B. All work shall be coordinated with other trades to avoid conflicts and to obtain a neat competent installation that will afford maximum accessibility for easy and proper operation, maintenance, service and headroom. All work shall be installed in a manner that permits easy accessibility and proper removal of system components requiring periodic service. Any items determined to be in non-compliance shall be corrected by the Contractor at no additional expense to the Government.
- C. The drawings show or describe the general arrangement of equipment, articles, assemblies, appurtenances but do not show all required fittings, drains, air vents, supports and may not identify all required accessories, components, fittings, and offsets that are necessary to properly complete the installation for the purpose intended. The contract drawings are diagrammatic only intended to show general layout of conduit, ductwork, piping, equipment, terminals, specialties and not intended to show all required offsets, details, accessories and equipment to be connected. Provide all necessary fittings, offsets and pipe runs based on field measurements and reviewed coordination drawings. Coordinate with other trades for space available and relative location of equipment and accessories to be connected at all locations. The Contractor shall alter locations of items where necessary to avoid interference and clearance difficulties. Locations of components and equipment shall be adjusted to accommodate the work with interferences anticipated and encountered. The Contractor shall determine the exact routing and location of systems prior to fabrication and installation. Accurate field measurements and coordination drawings shall be prepared to establish the locations and characteristics of the various systems which are existing to remain. It is the intent of the drawings/specifications that the Contractor provides **all** materials, labor and coordination necessary to complete the work described or implied by the contract documents at no additional cost/time to the Government. The Contractor shall propose with submitted coordination drawings other dimensions with similar characteristics where necessary to avoid interferences and clearance difficulties. **Should the contract documents not agree with themselves the greater quantity of superior work and materials shall be performed.**
- D. Coordinate all mechanical, electrical, plumbing utility service, fire protection sprinkler system shutdowns and space access three (3) weeks in advance with the Project Engineer. Due to facility scheduling and access difficulties, some shutdowns and the performance of certain work will need to be performed during prime-time by the Contractor. Arrange phases and perform work to insure utility services for other buildings and areas at all times as required.
- E. Before placement and installation of work subject to tests the Contractor shall coordinate and notify the Resident Engineer in sufficient time to enable testing personnel to be present at the site in time for proper testing and field inspection. Such prior notice shall be not less than two (2) weeks unless otherwise designated by the Resident Engineer.

- F. For further details and requirements refer to Section 01 45 99, QUALITY CONTROL – INSPECTION – TESTING SERVICES.

1.4 QUALITY ASSURANCE

- A. Independent Electrical System Inspection/Testing Organization:
1. Agency that is financially independent of equipment manufacturer, supplier, and installer. Inspection/Testing of the entire electrical system shall be performed by an independent agency regularly involved in the specified work.
 2. Certification: Documentation upon completion of inspection/testing to include results, names of independent agency individuals performing work, detailed procedures followed for inspection/testing, and certification that all results were within the limits specified.
- B. When Factory Testing Is Specified:
1. The Government shall have the option of witnessing factory tests. Contractor shall notify the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 2. Four (4) copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
 3. When equipment fails to meet factory test and re-inspection is required, the Contractor shall be liable for all additional expenses, including expenses of the Government.
- C. Products and associated systems shall be safe, reliable, efficient, durable, easily and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified. All construction firms and personnel shall be experienced and qualified specialists in the applicable industrial and institutional construction.
- D. Product Criteria:
1. Materials, equipment and associated systems shall be comprised of high quality industrial-class and institutional-class products of current production by manufacturers that are experienced specialists in the required products.
 2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly. Asbestos products, or equipment or materials containing asbestos shall not be used.
 3. Products and systems shall be supported by service organizations that maintain a complete inventory of repair parts and are located reasonably close to the site.
 4. When more than one unit of the same class of product is required, such units shall be the products of a single manufacturer.
 5. Brand Names: Certain items may be identified by brand name make and model. Identification of these items by a “brand name” description is intended to indicate the quality and salient physical, functional, or performance characteristics of products that will be satisfactory and is not intended to be restrictive. Unless clearly indicated in the offer that an “equal” product is offered, the offer shall be considered as offering a referenced brand name product. Offers of “equal” products or items will be considered for this award if such product or item is clearly identified in the offer and is determined by the Government to fully meet the salient physical, functional, or performance characteristics of the product or item named. The Government’s determination as to the acceptability of the “equal” product shall be based on information furnished or otherwise identified in the offer, as well as other information reasonably available to the Government. If the item cited is no longer available, the manufacturer’s currently available item that replaces the cited model shall be provided.

- E. Assemblies and Components:
 - 1. Manufacturers of assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 2. Components shall be compatible with each other and with the total assembly for the intended service.
 - 3. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.
 - 4. Components of an assembled unit need not be products of the same manufacturer.
 - 5. Constituent parts that are similar shall be the product of a single manufacturer.
- F. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Resident Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.
- G. Guaranty: In accordance with WARRANTY OF CONSTRUCTION (FAR 52.246-21).
- H. For further details and requirements refer to Section 01 45 99, QUALITY CONTROL – INSPECTION – TESTING SERVICES.

1.5 QUALIFICATIONS OF PRODUCTS AND SERVICES

Approval by Contracting Officer is required of product and services of proposed manufacturers, suppliers, installers and will be based upon submission by Contractor of certification that:

- A. Installer Qualifications: The installer has technical qualifications, licenses and specialized experience in installing products similar in material, design, and extent to those indicated with a record of successful in-service performance. Submit list of acceptable installations.
- B. Manufacturer Qualifications: The manufacturer is regularly engaged in manufacturing the specified material as a principal product with a minimum of five (5) years experience.
- C. Product Qualifications: The design, model and size of each item shall have been in satisfactory and efficient operation on at least three (3) installations for three (3) years. Submit list of acceptable product installations.
- D. Source Limitations: Each product type shall be the same and the product of a single manufacturer.
- E. Service Qualifications: There shall be a permanent service organization maintained that will render satisfactory service to restore operations within four (4) hours of receipt of notification in event of an emergency or within 24 hours in a non-emergency. Submit name and address of service organizations.

1.6 EQUIPMENT REQUIREMENTS

- A. The contract drawings are diagrammatic only intending to show general runs and locations of systems and equipment, and not intended to show all required details and accessories. All work shall be accurately laid out and coordinated with other Trades to avoid conflicts and afford maximum accessibility for easy of operation, service, maintenance and headroom. All work shall be installed in a manner permitting removal of components requiring periodic replacement and maintenance without damage to other parts of equipment and system components.
- B. Where variations from the contract requirements are necessary in accordance with Section 01 45 99, QUALITY CONTROL – INSPECTION – TESTING SERVICES, and requested in accordance Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, the installation methods, connecting work and related components shall be included, not limited to

additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels at no additional cost to the Government.

1.7 EQUIPMENT INSTALLATION REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the NEC for all voltages specified.
- C. Inaccessible Equipment:
 - 1. Equipment shall be installed at conveniently accessible locations viewable in a direct line of sight parallel and/or perpendicular to the building lines as determined by the Government. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Government.
 - 2. "Conveniently accessible" is defined as being capable of being reached and serviced without the use of ladders, or without reaching or climbing or crawling under or over or behind obstacles such as motors, fans, pumps, pipes, belt guards, high voltage lines, transformers, and ductwork.
- D. Certifications: Submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.

1.8 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the NEC, install an identification sign that will clearly indicate information required for use and maintenance of items such as cabinets, separately enclosed circuit breakers, control devices and other significant equipment. All installed equipment shall be labeled with name and source of energy utilizing the hospital nomenclature as directed by the Project Engineer. Systems shall be color code labeled with contents and flow direction in 8 foot intervals.
- B. Nameplates: Bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- C. Equipment Identification: Other labels shall be either black or red laminated phenolic resin with a white core, engraved lettering shall be a minimum of 3/16-inch high. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.9 SINGULAR NUMBER

Where any device or part of equipment is referred to in these specifications in the singular number e.g., "the switch", this reference shall be deemed to apply to as many such devices as are necessary to complete the installation shown on the drawings and recommended by the manufacturer for the purpose intended.

1.10 TEST STANDARDS

- A. All material and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no

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nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

- B. Contractor shall engage independent testing companies specialized and certified in the required testing of all installed equipment and components not performed by the manufacturer. The testing firms shall be professionally independent of the manufacturers, suppliers, installers of the equipment and systems evaluated. The testing firms shall meet the criteria for full membership of the International Electrical Testing Association. The site personnel shall consist of an independent licensed electrician and a certified electrical technician. Testing and inspection shall be performed during a minimum of two periods (rough and final phases) of electrical construction.
- C. Definitions:
 - 1. Listed; equipment or device of a kind mentioned which:
 - a. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
 - b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
 - 2. Labeled; equipment or device is when:
 - a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.
 - b. The laboratory makes periodic inspections of the production of such equipment.
 - c. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
 - 3. Certified; equipment or product is which:
 - a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
 - c. Bears a label, tag, or other record of certification.

1.11 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, furnish the following:

- A. Manufacturer's Literature and Data: Submit under the pertinent specification section.
 - 1. Equipment, components and materials shown on drawings and/or identified.
 - 2. Submit all starters that are part of the electrical package.
 - 3. Hangers, inserts, supports and bracing.
 - 4. Fire-stopping materials.
- B. Coordination Drawings: Provide complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas. Refer to SUBCONTRACTS AND WORK COORDINATION (VAAR 852.236-80), and Section 01 45 99, QUALITY CONTROL – INSPECTION – TESTING SERVICES. In addition, provide details of the following:
 - 1. All equipment and component layouts with submittal & drawing tag, utility requirements, dimensions, locations off walls & column lines, top and bottom elevations.

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2. Electrical space layout details including above all the ceiling areas throughout the project showing all existing/new equipment, piping, ductwork, major raceways/conduit, etc.
- C. Manuals: Submitted in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
 1. Maintenance and Operation Manual, submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, manufacturer's standard binders or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
 2. Inscribe the following identification words on the cover: "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
 3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
 4. The manual shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing startup, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation and maintenance instructions.
 - e. Safety precautions.
 - f. Diagrams and illustrations.
 - g. Testing methods.
 - h. Performance data.
 - i. Lubrication schedule including type, grade, temperature range, and frequency.
 - j. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - k. Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.
- D. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- E. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
 1. Submittals shall be assembled using the Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, sample Cover Sheet Attachment A and Checklist Table Attachment B forms.
 2. Submittals shall contain the list of items being used, applicable specification paragraph numbers and/or drawing numbers (and other information required for exact identification

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- of location for each item); manufacturer and brand, referenced Publication and such additional information as may be required by specifications for particular item.
3. Submit each section separately.
- F. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
- G. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material that has not had prior approval will not be permitted at the job site.
1. Approvals will be based on complete submission of manuals together with shop drawings.
 2. Provide copies of approved Electrical submittals to the Testing subcontractor.
- H. After approval and prior to installation, furnish the Resident Engineer with one sample of each of the following:
1. Each type of receptacle, toggle switch, outlet box, device plate, engraved nameplate, wire and cable splicing and terminating material and molded case circuit breaker.
 2. A 12 inch length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
 3. Each type of conduit coupling, bushing and termination fitting.
 4. Conduit hangers, clamps and supports.
- I. Visual/Electrical Inspections & Tests: Submit tentative schedules for the Division 26, 27, 28 required inspections and tests. Refer to the Electrical System Inspecting & Testing Checklist (Attachment A) for the minimum requirements and details.
- J. As-Built System Line Diagrams: Provide detailed drawings for the electrical systems.
1. AUTOCAD and PDF file drawings on CD (Version as required by the VA).
 2. Two sets of full size (Scaled: 1/8" = 1'-0") reproducible drawings.
 3. Two sets of half size reproducible drawings.
- K. Certifications: After completion of each Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.
- L. In addition to the requirement of SUBMITTALS, the VA reserves the right to request the manufacturer to arrange for a VA representative to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.

1.12 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.
- B. Protection: Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, rain and cold.
 - 1. Equipment and material placed on the job site shall remain in the custody of the Contractor until acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
 - 2. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or equal. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.
 - 3. Damaged equipment shall be replaced or repaired to original operating condition as determined and directed by the Resident Engineer. Such repair or replacement shall be at no additional cost to the Government.
 - 4. Existing equipment and systems being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected against any damage.
- C. Cleaning:
 - 1. Enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing, operating and painting.
 - 2. Prior to final inspection and acceptance of the facilities and areas for beneficial use by the Government, the equipment and systems shall be thoroughly cleaned and painted.
 - 3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.
 - 4. In addition, the following special conditions apply:
 - a. Cleaning shall be thorough. Use cleaning materials and methods recommended by the manufacturers for the specific tasks. Remove all rust prior to painting and from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.
 - b. Control and instrument panels shall be cleaned; damaged surfaces repaired, and touched-up with matching paint obtained from panel manufacturer.
 - c. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment if necessary to achieve proper finish.

1.13 APPLICABLE PUBLICATIONS

Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. Except where a specific date is provided the issue in effect on the date of Bids/Proposals shall be applicable. In the event that criteria requirements conflict, the most stringent requirements shall be met.

- A. Publications listed in each Division 26, 27, 28 specification section form a part of this specification to the extent referenced.
- B. American Society for Testing and Materials (ASTM):

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- A36/A36M Carbon Structural Steel
- A575 Steel Bars, Carbon, Merchant Quality, M-Grades
- E84 Surface Burning Characteristics of Building Materials
- E119 Fire Tests of Building Construction and Materials
- C. Federal Specifications (Fed. Spec.):
 - FF-S-325..... Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)
- D. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
 - SP-58..... Pipe Hangers and Supports – Materials, Design and Manufacture
 - SP-69..... Pipe Hangers and Supports – Selection and Application
 - SP-127..... Bracing for Piping Systems, Seismic – Wind – Dynamic, Design, Selection, Application
- E. National Electrical Manufacturers Association (NEMA):
 - MG-1 Motors and Generators
- F. National Fire Protection Association (NFPA):
 - 70..... National Electric Code (NEC)
 - 101 Life Safety Code
- G. Occupational Safety and Health Administration (OSHA):
 - Part 1910 Occupational Safety and Health Standards

PART 2 – PRODUCTS

2.1 ASSEMBLED PRODUCTS

- A. Provide maximum standardization of components to reduce spare part requirements. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts that are alike shall be products of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - 4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.
- B. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- C. Major items of equipment, which serve the same function, must be the same make and model. Exceptions will be permitted if performance requirements cannot be met.

- D. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system.

2.2 ELECTRIC MOTORS

- A. Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems. Provide special energy efficient motors where scheduled. Unless otherwise specified for a particular application use electric motors with the following requirements.
- B. Single Phase Motors: Capacitor start type for hard starting applications. Motors for centrifugal fans may be split phase or permanent split capacitor (PSC).
- C. Poly Phase Motors: NEMA Design B, squirrel cage, induction type.
- D. Rating: Continuous duty at 100 percent capacity in an ambient temperature of 40 degrees centigrade (104 degrees F); minimum horsepower as shown on drawings; maximum horsepower in normal operation not to exceed nameplate rating without service factor.
- E. Special Requirements:
 - 1. Where motor power requirements of equipment furnished deviate from power shown on plans, provide electrical service designed under the requirements of NFPA 70 without additional time or cost to the Government.
 - 2. Assemblies of motors, starters, controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.
 - 3. Wire and cable materials specified in the Electrical Division of the specifications shall be modified as follows:
 - a. Wiring material located where temperatures can exceed 71 degrees C (160 degrees F) shall be stranded copper with Teflon FEP insulation with jacket.
 - b. Other wiring to control panels shall be NFPA 70 designation THWN.
 - c. Provide shielded conductors or wiring in separate conduits for all instrumentation and control systems where recommended by manufacturer of equipment.
 - 4. Select motor sizes so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
 - 5. Motors utilized with variable frequency drives shall be rated "inverter-ready" per NEMA Standard, MG-1, Part 31.4.4.2. Provide motor shaft grounding apparatus that will protect bearings from damage from stray currents.
- F. Motor Efficiency and Power Factor: All motors, when specified as "high efficiency" by the project specifications on driven equipment, shall conform to efficiency and power factor requirements specified, with no consideration of annual service hours. Motor manufacturers generally define these efficiency requirements as "NEMA premium efficient" and the requirements generally exceed those of the Energy Policy Act of 1992 (EPACT). Motors not specified as "high efficiency" shall comply with EPACT.
- G. Insulation Resistance: Not less than one-half mega ohm between stator conductors and frame, to be determined at the time of final inspection.

2.3 VARIABLE SPEED MOTOR CONTROLLERS

- A. Refer to Section 26 29 11, LOW VOLTAGE MOTOR STARTERS.
- B. The combination of controller and motor shall be provided by the manufacturer of the driven equipment, such as pumps and fans, and shall be rated for 100 percent output performance.

Multiple units of the same class of equipment, i.e. air handlers, fans, pumps, shall be product of a single manufacturer.

- C. Motors shall be energy efficient type and be approved by the motor controller manufacturer. The controller-motor combination shall be guaranteed to provide full motor nameplate horsepower in variable frequency operation. Both driving and driven motor/fan sheaves shall be fixed pitch.
- D. Controller shall not add any current or voltage transients to the input AC power distribution system, DDC controls, sensitive medical equipment, etc., nor shall be affected from other devices on the AC power system.

2.4 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings and maintenance manuals. Provide laminated plastic signs, with engraved lettering not less than 5 mm (3/16-inch) high, designating functions, for all equipment, switches, motor controllers, relays, meters, control devices. Identification for piping is specified in Section 09 91 00, PAINTING.
- B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 48 mm (3/16-inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING, permanently fastened to the equipment. Identify unit components such as coils, filters, fans, etc.
- C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 48 mm (3/16-inch) high riveted or bolted to the equipment.
- D. Control Items: Label all sensors, controllers and control devices. Identify and label each item as they appear on the control diagrams.

2.5 PIPE AND EQUIPMENT SUPPORTS/RESTRAINTS

- A. Vibration Isolators: Refer to Section 23 05 41, NOISE & VIBRATION CONTROL FOR HVAC PIPING/EQUIPMENT.
- B. Attachment to Concrete Construction:
 - 1. Concrete insert: Type 18, MSS SP-58.
 - 2. Self-drilling expansion shields and machine bolt expansion anchors: Fed. Spec. FF-S-325, permitted in concrete not less than four inches thick. Applied load shall not exceed one-fourth the proof test load listed in Fed. Spec. FF-S-325.
 - 3. Power-driven fasteners: Permitted in existing concrete or masonry not less than four inches thick when approved by the Resident Engineer for each job condition. Applied load shall not exceed one-fourth the proof test load listed in Fed. Spec. FF-S-325.
- C. Hanger Rods: Hot-rolled steel, ASTM A36 or A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 1-1/2 inches minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.
- D. Multiple Trapeze Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 1-1/2 inches by 1-1/2 inches, No. 12 gage, designed to accept special spring held, hardened steel nuts.
 - 1. Allowable hanger load: Manufacturers rating less 200 pounds.
 - 2. Guide individual pipes on the horizontal member of every other trapeze hanger with 1/4-inch U-bolt fabricated from steel rod.
- E. Seismic Restraint of Equipment and Piping: Seismic restraint of equipment, ductwork and piping is required for projects in seismic areas where peak horizontal ground acceleration A max

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is 0.10g or greater. The A max values are listed in VA Handbook H-08-8, titled "Earthquake Resistant Design Requirements for VA Hospital Facilities".

1. Seismic force design criteria:
 - a. Piping resiliently supported: 120 percent of the weight of the system components and contents.
 - b. Piping not resiliently supported: 60 percent of the weight of the system components and contents.
 - c. Except as noted above; meet the more severe requirements of the Local Code and the latest Uniform Building Code for determining seismic force F_p .
2. Provide one of the following as applicable:
 - a. Design and installation shall meet the most current requirements of the National Uniform Seismic Installation Guidelines (NUSIG). Contractor shall submit all design tables and information for the design force levels, stamped and signed by a professional engineer registered in the State where the project is located.
 - b. Where NUSIG requirements are not met completely, submit proposed alternate details and calculations to completely address seismic bracing requirements. Such designs shall use the more severe of the Local Code and the Uniform Building Code requirements for determining seismic forces, and be performed, stamped and signed by a professional engineer registered in the State where the project is located. Revise if necessary any details shown on the contract drawings for vertical support and lateral bracing, and submit for the approval of the Resident Engineer to meet the required design criteria.

2.6 PIPE PENETRATIONS

- A. Install sleeves during construction for other than blocked out floor openings for risers in mechanical bays.
- B. To prevent liquid spills from passing to a lower level provide the following as applicable:
 1. At sleeves: Extend sleeve 1 inch above finished floor and provide sealant for watertight joint.
 2. At blocked out floor openings: Provide 1-1/2 inch angle set in silicone adhesive around opening.
 3. At drilled penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- C. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval from the Resident Engineer.
- D. Sheet Metal, Plastic, or Moisture-resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- E. Cast Iron or Zinc Coated Pipe Sleeves: Provide for pipe passing through exterior walls below grade. Make space between sleeve and pipe watertight with a modular or link rubber seal. Seal shall be applied at both ends of sleeve.
- F. Galvanized Steel Pipe Sleeves: Provide for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. Provide sleeve for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, connect sleeve with floor plate.

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- G. Brass Pipe Sleeves: Provide for pipe passing through quarry tile, terrazzo or ceramic tile floors. Connect sleeve with floor plate.
- H. Sleeves are not required for wall hydrants for fire department connections or in drywall construction.
- I. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with firestopping material and sealant to prevent the spread of fire, smoke, and gases.
- J. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

2.7 TOOLS AND LUBRICANTS

- A. Tools: Furnish the Resident Engineer, special tools not readily available commercially, that are required for disassembly or adjustment of equipment furnished.
- B. Lubricants: A minimum of one quart of oil, and one pound of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application.

PART 3 – EXECUTION

3.1 GENERAL

- A. Proper precautions shall be taken so that adjacent occupied areas shall not be disturbed or contaminated during construction. The VA Project Engineer shall be consulted three (3) weeks in advance for approval of work schedules in occupied areas. Due to hospital scheduling and access difficulties some work will likely require prime-time performance by the Contractor. Work above ceilings in areas beyond the construction boundary shall be cleaned and closed with matching undamaged materials by the close of each day.
- B. Verify in advance of performing any work the availability, type, capacity, location of energy systems eg, Mechanical, Electrical, Plumbing necessary to perform the work. Provide all necessary labor, material and coordination to complete the work described or implied by the construction documents for equipment to operate in the manner intended at no additional cost or time to the Government. In the event that the characteristics of any equipment do not agree with the characteristics of the available system, make the necessary modifications. All appurtenances, assemblies, articles, equipment, components, and materials furnished shall be new and free from defects, and be of the most suitable grade, size and capacity for the purpose intended, unless otherwise specified or approved by the VA Project Engineer. **Should the contract documents not agree with themselves the greater quantity of superior quality materials and work shall be used.**
- C. All appurtenances, assemblies, articles, equipment, components, and materials installed shall be complete for operation, service and maintenance for the purpose intended not limited to the details and information provided. All appurtenances, assemblies, articles, equipment, components, materials and execution shall be in conformance with the contract documents, manufacturer's written procedures and recommendations, latest editions of all applicable Federal/State/City codes, regulations, ordinances, and the jurisdiction having authority JHA as applicable. Except where specific dates are given, the issue (including amendments, addenda, revisions, supplements, and errata) in effect on the date of Invitation for Bids shall be applicable. **In the event that criteria requirements conflict, the most stringent requirement (the greater quantity of superior quality materials and work) shall be met.**
- D. Construction shall not block proper access to new/existing appurtenances, assemblies, articles, equipment, components, and materials requiring operation, service and maintenance whether

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detailed on the drawings or not. Access must be conveniently placed as determined by the VA Project Engineer.

- E. Properly relocate any existing systems considered interfering with the installation of new construction at no additional expense to the Government, and after confirming plans with the VA Project Engineer. This will include the relocation and/or reinstallation of items within the construction boundaries to perform and complete all necessary work as required.
- F. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to original condition. Care shall be used during removal and installation to avoid damaging the surrounding surfaces. Damaged surfaces and items within the contract limits shall be patched, repaired, refinished, painted and/or replaced as necessary with materials comparable to the surrounding material and surface equal to new conditions unless otherwise noted or directed by the VA Project Engineer. Finished surfaces shall be indistinguishable from the surrounding area.
- G. All installed equipment shall be labeled with name and source of energy utilizing the facility nomenclature as directed by the VA Project Engineer. Energy systems eg, Mechanical, Electrical, Plumbing shall be color code labeled with contents and flow direction in 8 foot intervals.
- H. Work shall be accomplished with all affected systems or equipment de-energized where possible. Work shall comply with the requirements of OSHA Part 1910. When an outage for the required work cannot be accomplished in this manner, the following requirements are mandatory:
 - 1. Electricians shall use full protective equipment certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc while working on energized systems in accordance with NFPA 70E.
 - 2. Electricians shall wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
 - 3. Before initiating work, a job specific work plan shall be developed by the Contractor with a peer review by the Resident Engineer and Medical Center staff. The work plan shall include procedures to be used on and near the live systems and equipment, barriers to be installed, safety equipment to be used and exit pathways.
 - 4. Work on energized systems or equipment cannot begin until prior written approval is obtained.

3.2 DEMOLITION AND MAINTAINING UTILITY SERVICES

- A. During the execution of work, deactivation, relocation, rerouting, removal of existing equipment and systems shall be performed by the contractor as required by the job conditions to facilitate the installation of the new systems.
- B. Continuous operation of existing systems is required during demolition, tie-ins, relocation, rerouting and removal work. Outages required for construction purposes shall be scheduled in a manner that shall afford the shortest possible duration. Shutdowns shall be scheduled with the facility for specified mutually agreeable periods. After each period, the interruption shall cease and the service restored to normal operation and the process repeated until the work is completed. Due to the hospital schedules and access difficulties, some shutdowns and the performance of certain work shall be performed during prime time by the contractor.
- C. Maintain and restore all utilities servicing undisturbed regions which pass through the renovated areas. Contractor shall utilize deep scan metal detectors prior to coring/drilling holes in existing structure, and ground detecting core/drill equipment during operation to avoid damaging active existing systems buried in the existing structures.

- D. Devices that are not scheduled for deactivation and are loop fed from devices being removed shall be fed from the extended existing circuits unless otherwise specified. Where existing fixtures are removed from continuous lengths due to architectural modifications, the remaining fixtures shall be reconnected to the system with branch circuit wiring and switches as required by the job conditions. Re-hang unsupported existing to remain appurtenances as required by the job conditions with suitable supports in compliance with applicable codes.
- E. Remove electrical appurtenances in affected areas. Remove all abandoned materials, equipment, components, articles, assemblies, appurtenances within the construction area including but not limited to ducts, pipes, utilities, hangers, suspension systems, fixtures, surface mounted device boxes, switches, receptacles, wires, conduits back to the termination point where they originate eg, panel, riser. When utility feeds other active devices, components shall be removed back to the nearest termination point. All removed components shall be terminated properly. Other existing items not compatible with the new construction shall be removed unless otherwise directed by the Project Engineer.
- F. Care shall be used during removal and installation to avoid damaging the surrounding surfaces. Damaged surfaces and items within the contract limits shall be patched, repaired, refinished, painted and/or replaced as necessary with materials to match the existing surrounding material and surface unless otherwise noted or directed by the Project Engineer. Where existing items are removed, ceiling/wall/floor areas shall be patched to match surrounding material and surface. Finished surfaces shall be indistinguishable from the surrounding area.
- G. Where device installation into existing walls is necessary the installation shall include all modifications required by the job conditions to recess the device.
- H. For further details refer to Section 02 41 00, DEMOLITION.

3.3 INSTALLATION

- A. In the event that criteria requirements conflict, the most stringent requirement shall be met.
- B. Coordinate location of equipment, components, materials and articles with other trades. Locate equipment, components, materials and articles clear of proper operation and service to other equipment, components, materials and articles eg, windows, doors, openings, lights, outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- C. Construction shall not block proper access to new/existing materials, equipment, components, articles, assemblies, appurtenances requiring operation, service and maintenance **whether detailed on the drawings or not**. Access must be conveniently placed as determined by the VA Project Engineer.
- D. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to original condition.
- E. Protection and Cleaning:
 - 1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Resident Engineer. Damaged or defective items in the opinion of the Resident Engineer shall be replaced.
 - 2. Protect all finished parts of equipment from rust prior to operation by means of protective coating and wrapping. Close openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water, chemicals, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

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- F. Install devices with due regard for ease in reading or operating and maintaining said devices. Locate and position devices to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or work.
 - G. Work in Existing Building:
 - 1. Perform as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, Article, RESTORATION, alterations, relocation and restoration of existing systems and equipment.
 - 2. Arrange, phase and perform alterations to existing utility services to assure the least interference with normal operations of the facility.
 - H. Interconnection of Instrumentation or Control Devices: Generally, electrical and pneumatic interconnections are not shown but must be provided.
 - I. Electrical and Pneumatic Interconnection of Controls and Instruments: Generally not shown, but must be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments and computer workstations. Comply with NFPA-70.
 - J. Switchgear Drip Protection: Every effort shall be made to eliminate the installation of pipe above electrical and communication switchgear. If this is not possible, encase pipe in a second pipe with a minimum of joints.
 - K. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
 - L. Minor Piping: Generally, small diameter pipe runs are not shown but must be provided.
 - M. Install piping expansion joints as per manufacturer's recommendations.
 - N. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
 - O. Cut required openings through existing masonry and reinforced concrete using diamond core rotary drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Resident Engineer. Locate openings that will least effect structural slabs, columns, ribs or beams. Refer to the Resident Engineer for determination of proper design for openings through structural sections and opening layouts approval, prior to cutting or drilling into structure. After Resident Engineer's approval, carefully cut opening through construction no larger than absolutely necessary for the required installation. All openings must be patched.
- 3.4 TEMPORARY PIPING AND EQUIPMENT
- A. Continuity of operation of existing utilities shall generally require temporary installation or relocation of equipment and piping.
 - B. Contractor shall provide all required utilities. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities.
 - C. Temporary utilities shall be completely removed and any openings in structures sealed upon completion of permanent work. Provide necessary blind flanges and caps to seal open piping remaining in service.
- 3.5 RIGGING
- A. Design is based on application of available equipment. Openings in building structures are planned to accommodate design scheme.

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- B. Alternative methods of equipment delivery may be offered by Contractor and will be considered by Government under specified restrictions of phasing and maintenance of service as well as structural integrity of the building.
- C. Close all openings in the building when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.
- D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility. Upon request, the Government will check structure adequacy and advise Contractor of recommended restrictions.
- E. Contractor shall check all clearances, weight limitations and shall offer a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement shall be at Contractor's cost, time and responsibility.
- F. Rigging plan and methods shall be referred to Resident Engineer for evaluation prior to actual work.
- G. Restore building to original condition upon completion of rigging work.

3.6 PIPE AND EQUIPMENT SUPPORTS

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Only drill or burn holes in structural steel with the prior approval of the Resident Engineer.
- B. Use of chain, wire or strap hangers; wood for blocking, stays and bracing; or, hangers suspended from piping above will not be permitted. Replace or thoroughly clean rusty products and paint with zinc primer.
- C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1/2-inch clearance between pipe or piping covering and adjacent work.
- D. Overhead Supports: Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
- E. Floor Supports:
 - 1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Anchor and dowel concrete bases and structural systems to resist forces under operating and seismic conditions without excessive displacement or structural failure.
 - 2. Do not locate or install bases and supports until equipment mounted thereon has been approved. Size bases to match equipment mounted thereon plus 2 inch excess on all edges. Foundations shall have horizontal dimensions that exceed base frame dimensions by at least 6 inches on all sides. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
 - 3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.
 - 4. For seismic anchoring, refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- F. Provide additional equipment and pipe supports/restraints as necessary to meet the requirements of PART 2. Re-hang unsupported existing fixtures and utility service lines above ceiling where affected by work with suitable support devices in compliance with applicable

codes. All pipes, ducts, conduits, fixtures, equipment, utility and service lines are to be independently supported from the concrete slab not exceeding 8 foot intervals between supports. Light fixtures shall be supported to the building structure with two (2) safety chains in trapeze style at all four (4) corners.

3.7 MOTOR AND DRIVE ALIGNMENT

- A. Belt Drive: Set driving and driven shafts parallel and align so that the corresponding grooves are in the same plane.
- B. Direct-connect Drive: Securely mount motor in accurate alignment so that shafts are free from both angular and parallel misalignment when both motor and driven machine are operating at normal temperatures.

3.8 LUBRICATION

- A. Equip all devices with required lubrication fittings or devices. Lubricate all devices requiring lubrication prior to initial operation. Field check all devices for proper lubrication.
- B. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.

3.9 INSPECTIONS, OPERATING AND PERFORMANCE TESTS

- A. Schedule and perform all required inspections and tests for each system as required by the manufacturers and specified in the contract documents. Conduct inspections and tests required in various Sections of specifications in presence of an authorized representative of the Contracting Officer scheduled two (2) weeks in advance.
- B. Within one (1) week after completion of each phase of work in each applicable Section, submit to the Resident Engineer 4 copies of each inspection/testing report tabulating the results, analysis, recommendations documenting that all work performed including material/installation is in compliance with all the applicable manufacturers' requirements, codes and contract requirements. Inspections, tests or similar services shall be performed and certified by qualified electrical system specialists from an independent agency.
- C. Inspections and Tests shall be performed during a minimum of two (2) periods (rough and final). Performance shall include all new and existing to be reused components. Performance shall include running the equipment and controls as applicable through their complete operational cycles with all components installed and system balancing complete. Additional periods may be necessary due to project phasing and construction coordination. Inspection and Tests require documentation reports. The electrical system shall be considered ready for rough Inspections and Tests once the conduit system is complete and all the cables have been pulled.
- D. Test instruments, materials, labor to be supplied by the testing agency furnished by the Contractor.
- E. Verify that all installed and existing equipment, lighting, devices, components are clean and free of debris.
- F. Verify compliance of all material, workmanship and installation with approved Submittals, applicable Codes, and contract requirements. Verify nameplate data with drawings and specifications.
- G. Inspect all installed and reused equipment, lighting, devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.
- H. Obtain either equipment vendor approval or perform all test procedures recommended by manufacturers and demonstrate that all equipment and components meet the manufacturer's requirements and are installed properly, complete and ready for use for the purpose intended.

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- I. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values. Document all inspections and tests with detailed results. Provide a startup and checkout report indicating the performance of the systems with documentation demonstrating that all requirements were successfully completed for each task.
- J. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government. All systems must be completely operational meeting the requirements of the contract documents without defective installation/materials at the time of beneficial occupancy. Contractor is responsible for all VA costs associated with the delinquent execution of this effort.
- K. When completion of certain work or system occurs at a time when final settings and adjustments cannot be properly made to make performance tests due to seasonal conditions, then make performance tests for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work.
- L. Make tests under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- M. Pre-test 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.
- N. Systems shall be balanced, controlled and coordinated. A system is defined as the entire complex that 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 that 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 that 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.
- O. 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.
- P. 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.
- Q. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by a full member company of the International Electrical Testing Association utilizing an independent licensed electrician and a certified electrical technician furnished by the Contractor.
- R. Inspections and Tests shall be performed in accordance with NETA "Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems" and as indicated in the contract documents (drawings and individual specification sections). Provide recommendations and corrective actions required.
- S. Minimum Tests required:
 - 1. Refer to ATTACHMENT A "Electrical System Inspecting & Testing Checklist".
 - 2. Refer to ATTACHMENT C "NEC Compliance Checklist".
 - 3. Perform other tests and inspections as required in other parts of the contract documents.
 - 4. Upon completion, submit written certification with documentation to the Project Engineer demonstrating that the requirements were successfully completed for each task.

3.10 INSTRUCTIONS TO GOVERNMENT PERSONNEL

- A. Each applicable trade shall provide qualified, factory-trained representatives to furnish detailed instructions to Department of Veterans Affairs assigned personnel in the operation and complete maintenance for each system and piece of equipment. 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. The first 2 hour session shall be presented after submittal approval and equipment delivery, but before installation of any equipment. The second 2 hour session shall be accomplished two weeks prior to the final inspection. All instruction periods shall be at such times as scheduled by the Resident Engineer and shall be considered concluded only when the Resident Engineer is satisfied in regard to complete and thorough coverage of information.
- B. Instructional services of competent instructors shall be provided for a minimum of 4 hours of onsite training to designated Government employees covering the overall installation, operational methods, adjustments, care and periodic maintenance requirements for their systems.
- C. Each instructor shall be familiar with all parts of their respective system and shall be trained in operating theory as well as practical operation and maintenance practices. Factory trained instructors shall be employed wherever practical and available. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.
- D. Utilize the maintenance manual for the system or equipment as a text for instruction. **Instruction shall include a full and extensive review of the maintenance and operation manual.** Failure to execute this task shall require additional training sessions when this information is made available.
- E. Unless otherwise required or approved, the instruction shall be given during the regular work week after the equipment has been accepted and turned over to the Government for regular operation. Where significant changes or modifications in equipment are made under the terms of the guarantee, additional instruction shall be provided as may be necessary to acquaint the operating personnel of the changes or modifications. When more than four man-days (32 hours) of instruction are specified in other sections, approximately half of the time shall be classroom instruction and the other half at the site of the system or equipment.
- F. Upon completion, submit written acknowledgment with documentation to the Project Engineer demonstrating that the required instructions were successfully completed for each discipline.

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SECTION 26 05 21
LOW VOLTAGE ELECTRICAL CONDUCTORS & CABLES
(600 VOLTS & BELOW)

PART 1 – GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of wiring for the following . . .

- A. Low voltage power and lighting
- B. Communication
- C. Control
- D. Signal

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.

1.3 QUALITY ASSURANCE

Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data: Showing each cable type and rating.
- B. Certificates: Prior to the next Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. ANSI/EIA/TIA Publications:

568B Commercial Building Telecommunications Wiring Standard

569B Commercial Building Standard for Telecommunications Pathways
and Spaces

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- 606A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 607A Grounding and Bonding Requirements for Telecommunications in Commercial Buildings
- 758..... Grounding and Bonding Requirements for Telecommunications in Commercial Buildings
- B. American Society of Testing Material (ASTM):
 - D2301 Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape
- C. Federal Specifications (Fed. Spec.):
 - A-A-59544..... Cable and Wire, Electrical (Power, Fixed Installation)
 - J-C-30B..... Cable and Wire Electrical (Power, Fixed Installation)
 - HH-I-595C..... Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
 - W-F-406E Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
- D. National Fire Protection Association (NFPA):
 - 70..... National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
 - 4..... Armored Cable
 - 44..... Thermoset-Insulated Wires and Cables
 - 83..... Thermoplastic-Insulated Wires
 - 467 Electrical Grounding and Bonding Equipment
 - 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
 - 486C Splicing Wire Connectors
 - 486D Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations
 - 486E Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
 - 493..... Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables
 - 514B Fittings for Cables and Conduit
 - 1479..... Fire Tests of Through-Penetration Fire Stops
 - 1581..... Reference Standard for Electrical Wires, Cables, and Flexible Cords

PART 2 – PRODUCTS

2.1 CABLE AND WIRE (POWER AND LIGHTING)

- A. Cable and Wire: Fed. Spec. A-A-59544, except as hereinafter specified.
- B. Single Conductor:

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1. Annealed copper.
2. Stranded for sizes No. 8 AWG and larger.
3. Solid for sizes No. 10 AWG and smaller unless otherwise indicated.
4. Minimum size No. 12 AWG, except where smaller sizes are allowed.

C. Insulation:

1. General wire: Dual rated THHN-THWN conforming to UL 83.
2. Direct burial: UF or USE in accordance with UL 493.
3. Isolated power wire: Type XHHW with a dielectric constant of 3.5 or less.

D. Color Code:

1. Feeder and Branch circuit conductors:

Secondary Service System —

<u>208/120 Volt</u>	<u>Phase</u>	<u>480/227 Volt</u>
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray or White with colored tracer except other than Green

Isolated Power System —

Conductor 1	Orange
Conductor 2	Brown
Conductor 3	Yellow

2. The lighting circuit "switch legs" and 3-way switch "traveling wires" shall have color coding unique and distinct (i.e. pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate final color coding with the Resident Engineer.
3. Use solid color compound or solid color coating for No. 12 and No. 10 AWG branch circuit conductors and neutral sizes.
4. No. 8 AWG and larger Phase conductors using one of the following:
 - a. Solid color compound or solid color coating.
 - b. Stripes, bands, or hash marks of color specified above.
 - c. Colored as specified using 3/4-inch wide tape. Apply tape in half overlapping turns for a minimum of three inches for terminal points, and in junction boxes, pull boxes, and troughs. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.
5. For modifications and additions to existing wiring shall conform to the existing wiring system unless otherwise specified.
6. For isolated power wiring in accordance with the NEC.
7. For Nurse Call wiring shall conform to the existing hospital wiring system.

2.2 ARMORED CABLE

- A. HCF Type Armored Cable (AC): Fed. Spec. A-A-59544 and J-C-30B, NEC and UL 4, 83, 1479, 1581 for the assembly.
 - 1. Conductors color code shall comply with the appropriate section specified.
 - 2. Armor color code manufactured green for identification of cable type with additional color bands to identify circuit/phase conductor colors throughout its entire length. Comparable to either AFC's ColorSpec or Kaf-Tech's Color-Trak ID system (800- 757-6996) by Tyco.
- B. Where permitted by the NEC and UL, may only be used for whip/tap connections to suspended and recessed (requires approval) interior lighting fixtures with lengths limited to six (6) feet extending from a junction box to the fixture. Not permitted for normal, emergency or essential electrical system circuits.
- C. Assembly shall include an insulated green equipment grounding conductor, sized in accordance with the NEC in addition to an internal bonding strip of copper or aluminum in intimate contact with the armor for its entire length. Minimum size bonding strip shall be No. 16 AWG. The outer metal armor or sheath of the assembly shall be approved and identified as an acceptable grounding return path.
- D. Fittings:
 - 1. Shall meet the requirements of Fed. Spec. W-F-406E and UL 514B.
 - 2. Only steel or malleable iron material is acceptable.
 - 3. Clamp type with insulating throat.
- E. Supports:
 - 1. Parts and hardware: Zinc-coated or equivalent corrosion protection.
 - 2. Individual hangers: Straps, hangers or similar fittings shall be used and installed at intervals so as not to damage the cable. Staples are not permitted to be used for supports.

2.3 SPLICES AND JOINTS

- A. In accordance with UL 486A, C, D, E and NEC.
- B. Branch circuits (No. 10 AWG and smaller):
 - 1. Connectors: Solderless, screw-on, reusable pressure cable type, 600 volt, 105 degree C. with integral insulation, approved for copper and aluminum conductors.
 - 2. The integral insulator shall have a skirt to completely cover the stripped wires.
 - 3. The number, size, and combination of conductors, as listed on the manufacturers packaging shall be strictly complied with.
- C. Feeder Circuits:
 - 1. Connectors shall be indent, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material.
 - 2. Field installed compression connectors for cable sizes 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.
 - 3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Insulate with not less than that of the conductor level that is being joined.

- 4. Plastic electrical insulating tape: Fed Spec. HH-I-595 shall apply, flame retardant, cold and weather resistant.

2.4 COMMUNICATION WIRING (Telephone/Data)

- A. Telephone/Data wiring shall be plenum rated enhanced Category 6 voice/data quality 4 pair 24 AWG unshielded twisted pair (UTP) cables as manufactured by Berk-Tek.
- B. Each 4 pair conductor shall be color coded ... Jack A – Yellow; Jack B – Blue; Jack C – White, Jack D – Green.

2.5 CONTROL WIRING

- A. Unless otherwise specified in other sections of these specifications, size control wiring as specified for power and lighting wiring, except the minimum size shall be not less than No. 14.
- B. Control wiring shall be sized large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

2.6 FIRE ALARM, MEDICAL GAS ALARM AND SIGNAL WIRING

- A. Shall conform to the recommendations of the manufacturers of the communication and signal systems, and VA Engineering requirements.
- B. Provide wiring as required for the systems and components being furnished to provide a completely operating system.
- C. Multi-conductor cables shall have the conductors color-coded.

2.7 WIRE LUBRICATING COMPOUND

- A. Suitable for the wire insulation and conduit it is used with, and shall not harden or become adhesive.
- B. Shall not be used on wire for isolated type electrical power systems.

2.8 FIREPROOFING TAPE

- A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.
- B. The tape shall be self-extinguishing and shall not support combustion. It shall be arcproof and fireproof.
- C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.
- D. The finished application shall withstand a 200 ampere arc for not less than 30 seconds.
- E. Securing tape: Glass cloth electrical tape not less than 7 mils thick and 3/4-inch wide.

PART 3 – EXECUTION

3.1 CABLE AND WIRE INSTALLATION

- A. Install in accordance with NEC, and as required by the contract documents.
- B. Install all wiring in raceway systems, except where direct burial or HCF Type AC cables are used.
- C. Each circuit shall have its own individual neutral. Do not share neutral wires with other circuits.
- D. Splice cables and wires only in outlet boxes, junction boxes or pull boxes.

- E. Wires of different systems i.e. 120V, 277V shall not be installed in the same conduit or junction box system.
- F. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type that firmly clamps each individual cable and tightens due to cable weight.
- G. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.
- H. Seal cable and wire between the wire and conduit, where the cable exits the conduit, with a non-hardening approved compound.
- I. No more than three (3) single-phase branch circuits shall be installed in any one conduit.
- J. The wires shall be de-rated in accordance with NEC Article 310. Neutral wires, under conditions defined by the NEC, shall be considered current-carrying conductors.
- K. Unless specifically indicated on the plans, existing wiring shall not be reused for the new installation. Only wiring that conforms to the specifications and applicable codes may be reused. If existing wiring does not meet these requirements, existing wiring may not be reused and new wires shall be installed.
- L. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 - 2. Use ropes for pulling feeders made of nonmetallic material.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Resident Engineer.
 - 4. Pull in together multiple cables in a single conduit.

3.2 ARMORED CABLE INSTALLATION

- A. Installation: Where permitted by the NEC and UL, may only be used for whip/tap connections to suspended and recessed interior lighting fixtures with lengths limited to six (6) feet extending from a junction box to the fixture. Not permitted for normal, emergency or essential electrical system circuits.
- B. Install HCF Type AC cable as follows:
 - 1. Flattened, dented, deformed, or opened armor is not permitted. If damaged during installation, damaged cables shall be replaced with new undamaged material.
 - 2. Assure that cable installation does not encroach into the ceiling height head room, walkways, or doorways.
 - 3. Cut square with manufacturer's armor stripping tool and remove burrs.
 - 4. Remove enough armor from cable to permit sufficient conductor to extend into the enclosure.
 - 5. Cable shall be mechanically and electrically continuous.
 - 6. Secure cable to cabinets, junction boxes, and outlet boxes with fittings approved for grounding.
 - 7. Cables shall be run parallel or perpendicular to the building lines.
- C. Bends: Bends shall be made so that the cable is not damaged. The radius of the curve of the inner edge of any bend shall not be less than five times the diameter of the cable.
- D. Concealed Work: Cables installed above suspended ceilings shall be supported as specified.

- E. Exposed Work: Cables may be run exposed only in unfinished areas such as electrical closets or mechanical rooms and be supported as specified.
- F. HCF Type AC cable shall not be installed embedded in concrete.
- G. Cable Identification: Armor color code manufactured green for identification of cable type with additional color bands to identify circuit/phase conductor colors throughout its entire length.
- H. Cable Supports:
 - 1. The cable shall be secured by approved straps, hangers, or similar fittings designed and installed as to not damage the cable.
 - 2. Independently support the cable or install in cable trays. Do not use other supports i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts.
 - 3. Support within one (1) foot of each outlet box, junction box, cabinet, or fitting.
 - 4. Through Metal Framing: Not permitted for this use.
 - 5. Fished Cables: Not permitted for this use.
- I. Penetrations:
 - 1. Cutting holes in concrete and masonry in new and existing structures not permitted for this use.
 - 2. Where HCF Type AC cable passes through fire partitions, fire walls or smoke partitions, install a fire stop that provides an effective barrier against the spread of fire, smoke and gasses as specified in Section 07 84 00, FIRESTOPPING, with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between cables and openings with the fire stop material. Penetrations shall meet the requirements of UL 1479.

3.3 SPLICE INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices using approved methods at no additional cost to the Government.

3.4 COMMUNICATION WIRING (Telephone/Data)

- A. Unless otherwise specified, install wiring and connect from each faceplate jack (4 jacks for each outlet box) to the communication closet patch panel for a complete operating system. Provide plenum rated enhanced Category 6 voice/data quality 4 pair 24 AWG unshielded twisted pair (UTP) cables, faceplates, jacks and patch panels. Each 4 pair conductor shall be color coded ... Jack A – Yellow; Jack B – Blue; Jack C – White, Jack D – Green. Provide blank covers for unused locations.
- B. Furnish and pull wire in all communication conduits/sleeves. Cabling shall be installed in conduit in wall spaces to corridors. Route cables to the appropriate telecommunications closet to that section of the building in either the corridor raceway system or supported using a facility approved method. Seal all penetrations through fire rated barriers.
- C. Cable installation precautions shall be observed, including the elimination of cable stress caused by cable tension. Cables should not be routed in tightly cinched bundles. Cable bending radius shall not be less than 1/4-inch or 2 times the cable diameter. Cables shall be neatly bundled and routed without strain, protected and supported per NEC requirements. All cabling in walls shall be in conduit with seven (7) cables maximum in 1 inch conduit. Pairs shall not be untwisted any more than 1/4-inch for termination at patch panel and wall jacks. Do not split pairs. Cable shall be neatly bundled on supports and on the 19 inch racks.

- D. Install a permanent wire marker on each cable at each of the termination point ends designating the Building – Floor – Jack number. Label the patch panel with the corresponding jack number. Provide labeling in accordance with ANSI/EIA/TIA 606-A. All lettering for voice and data circuits shall be stenciled using either laser printers or thermal ink transfer process. Handwritten labels are not acceptable. Wire markers shall retain their markings after cleaning.
 - 1. Cable and Wires: Cables shall be labeled at both ends in accordance with ANSI/EIA/TIA 606-A. Labels shall be permanent in contrasting colors. Cables shall be identified according to the System "Record Wiring Diagrams".
 - 2. Equipment: System equipment shall be permanently labeled with contrasting plastic laminate or bakelite material. System equipment shall be labeled on the face of the unit corresponding to its source.
 - 3. Conduit, Cable Duct, and/or Cable Tray: Label conduit, duct and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum of 10 feet. In addition, each enclosure shall be labeled according to this standard.
 - 4. Termination Hardware: Label workstation outlets and patch panel connections using color coded labels with identifiers in accordance with ANSI/EIA/TIA 606-A and the "Record Wiring Diagrams".
 - 5. Provide the Project Engineer a list of the tagged cables with room numbers indicated.
 - E. Existing communication cables that are not being reused shall be tagged with the Building – Floor – Jack number then coiled and hung above the ceiling line in the corridor before removal. Provide the Project Engineer with a list of the tagged cables not being reused for assessment.
 - F. All telecommunications cables must be placed so as to avoid electrical interference caused by inductive loads such as fluorescent light ballast, electric motors, generators, etc.
 - G. All cables must be placed within 295 cable-feet of the patch panel in which the jack wiring terminates, per ANSI/EIA/TIA requirements.
 - H. Before acceptance of the work, test each system, station and wall jack to demonstrate compliance with the contract requirement. Each system shall be subjected to complete functional and operational tests including tests in place of each jack with a telecommunications wiring and equipment analyzer for testing of transmission quality. Tested parameters must equal or exceed acceptable criteria. Malfunctioning components shall be replaced and retested.
 - 1. Interim Inspection: Inspection shall verify cabling terminations in telecommunications rooms and at workstations adhere to color code for T568B – T568A pin assignments and cabling connections are in compliance with ANSI/EIA/TIA standards. Visually confirm Category 6 marking of outlets, faceplates, outlet/connectors and patch cords.
 - 2. Performance Testing: Perform Category 6 tests in accordance with ANSI/EIA/TIA 568-B.1 and ANSI/EIA/TIA 568-B.2. Test shall include wire map, length, impedance, attenuation, resistance, capacitance, insertion loss, return loss, propagation delay, delay skew, NEXT, PSNEXT, ELFEXT, PSELFEXT.
 - 3. Voice Testing: Connect to the network interface device at the demarcation point. Go off-hook and receive dial tone from the LEC. If a test number is available, place and receive a local, long distance, and FTS telephone call.
 - 4. Certification: Once any necessary corrections are made and testing has been completed, submit inspection/testing report tabulating the results for each cable with wire marker designation to the Project Engineer.
- 3.5 CONTROL, FIRE ALARM, MEDICAL GAS ALARM AND SIGNAL WIRING
- A. Unless otherwise specified in other sections of these specifications, install wiring and connect to perform the functions required for a completely operating system.

- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where power supply circuits are not shown for systems, connect them to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.
- D. Install a lockable red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.
- E. System voltages shall not exceed 120 volts and shall be lower voltages where shown on the drawings or required by the NEC.
- F. Install a permanent wire marker on each wire at each termination. Wire markers shall retain their markings after cleaning.
- G. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- H. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.6 DIRECT BURIAL CABLE INSTALLATION

Not Applicable.

3.7 FEEDER IDENTIFICATION

- A. In each interior, pullbox and junction box, install plastic tags on each circuit cables and wires to clearly designate their circuit identification and voltage.
- B. In manholes and handholes, provide tags of the embossed brass type, and also show the cable type and voltage rating. Attach the tags to the cables with slip free plastic cable lacing units.

3.8 FIELD INSPECTIONS AND TESTS

- A. Inspections (visual/mechanical) and Tests shall be performed during a minimum of two periods (rough and final). Due to project phasing and construction coordination additional periods may be necessary. The electrical system shall be considered ready for the rough Inspections and Tests once the conduit system is complete and all the cables have been pulled. Inspection and Tests requires witness of the VA scheduled 2 weeks in advance, and documentation reports.
- B. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by an independent agency utilizing a qualified system specialist furnished by the Contractor.
- C. Verify compliance of all material, workmanship and installation with approved Submittals, Contract Documents, and applicable Codes. Verify nameplate data with drawings and specifications.
- D. Inspect all installed and reused devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.
- E. Verify circuit and voltage tag designation at each manhole, handhole, disconnect, pull and junction box.
- F. Verify sections of cables and connections in accordance with single-line diagrams.
- G. Verify cable size and quantity in accordance with NEC and contract requirements.
- H. Verify application of the cable color code and labeling requirements.
- I. Verify that no neutral wires are shared between circuits.

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- J. Inspect exposed sections of cables for damage.
- K. All feeders and branch circuits (new, modified, existing) shall be tested after installation. Perform testing and verify installation in accordance with NFPA 70/99. Testing shall include, but is not limited to:
 - 1. Verify uniform resistance of parallel conductors.
 - 2. Measure insulation-resistance ie, "megger" on each conductor before connection to devices eg, fixtures, appliances, solid-state components with respect to ground phase-to-ground and adjacent conductors phase-to-phase with an applied potential of 1,000 Volts DC for one (1) minute. Test all motors after installation but before start-up. All conductors shall test free from short-circuits & grounds and the megger value shall exceed 50 megaOhms. Test shall utilize a calibrated precision digital multivoltage multirange insulation tester ie, megger meter.
- L. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- M. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

--- E N D ---

SECTION 26 05 26
GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies general grounding and bonding requirements of electrical and telecommunication installations for personnel safety, equipment operations and to provide a low impedance path for possible ground fault currents.
- B. Terminology:
 - 1. The terms “connect” and “bond” is used interchangeably in this specification and has the same meaning.
 - 2. “Grounding electrode system” refers to all electrodes required by NEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.

1.3 QUALITY ASSURANCE

Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data as applicable.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.
 - 3. Include details involving grounding for patient equipment and areas on plans.
- C. Test Reports: Provide certified test reports of ground impedance.
- D. Certifications: Prior to the next Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. American Society for Testing and Materials (ASTM):
 - B1 Standard Specification for Hard-Drawn Copper Wire
 - B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- C. National Fire Protection Association (NFPA):
 - 70 National Electrical Code (NEC)
 - 99 Health Care Facilities
- D. Telecommunications Industry Association (TIA):
 - J-STO-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
- E. Underwriters Laboratories, Inc. (UL):
 - 44 Rubber-Insulated Wires and Cables
 - 83 Thermoplastic-Insulated Wires and Cables
 - 467 Grounding and Bonding Equipment
 - 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors

PART 2 – PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes 4 AWG and larger shall be permitted to be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Isolated Power System: Type XHHW-2 insulation with a dielectric constant of 3.5 or less.
- D. Telecom System Grounding Riser Conductor: Telecommunications Grounding Riser shall be in accordance with J STO-607A. Use a minimum 1/0 AWG insulated stranded copper grounding conductor unless indicated otherwise.
- E. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

2.2 GROUND RODS

- A. Copper clad steel, 3/4-inch diameter by 10 feet long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance.

2.3 SPLICES AND TERMINATION COMPONENTS

Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.4 TELECOMMUNICATION SYSTEM GROUND BUSBARS

- A. Provide solid copper bus bar, pre-drilled from two-hole lug connections with a minimum thickness of 1/4-inch for wall and backboard mounting using standard insulators sized as follows:
 - 1. Room Signal Grounding: 12 inches by 4 inch.
 - 2. Master Signal Ground: 24 inches by 4 inch.

2.5 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:
 - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lock washers.
 - 2. Ground Bus Bars: Two-hole compression type lugs using tin-plated copper or copper alloy bolts and nuts.
 - 3. Rack and Cabinet Ground Bars: one-hole compression-type lugs using zinc-plated or copper alloy fasteners.
- C. Cable Shields: Make ground connections to multipair communications cables with metallic shields using shield bonding connectors with screw stud connection.

2.6 EQUIPMENT RACK AND CABINET GROUND BARS

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 3/8-inch by 3/4-inch.

2.7 GROUND TERMINAL BLOCKS

- A. At any equipment mounting location, e.g. backboards and hinged cover enclosures, where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.8 SPLICE CASE GROUND ACCESSORIES

- A. Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use 6 AWG insulated ground wire with shield bonding connectors.

2.9 COMPUTER ROOM GROUND

- A. Provide 1/0 AWG bare copper grounding conductors bolted at mesh intersections to form an equipotential grounding grid. The equipotential grounding grid shall form a 24 inch)mesh pattern. The grid shall be bonded to each of the access floor pedestals.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Ground in accordance with the NEC, and as required by the contract documents.
- B. System Grounding:
 - 1. Secondary service neutrals ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Ground the secondary neutral in separately derived systems.
 - 3. All circuits shall include a grounding/bonding conductor. Conduit shall not be used as the only grounding path.
 - 4. Isolation transformers and isolated power systems shall not be system grounded.
- C. Equipment Grounding: Metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Special Grounding: For patient care area electrical power system grounding, conform to NFPA 99, "Safe Use of Electricity in Patient Care Areas of Hospitals" and Article 517, "Health Care Facilities" of NFPA 70.
- E. Make grounding connections which are buried or otherwise normally inaccessible, except connections for which periodic testing access is required, by exothermic weld.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Connect the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode:
 - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Provide jumpers at insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system or connect to the service equipment ground bus.
- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear, Switchboards, and Unit Substations:
 - 1. Connect the various feeder green grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
 - 4. Connect the neutral to the ground bus.

- E. Transformers:
 - 1. Exterior: Exterior transformers supplying interior service equipment shall also have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 - 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the ground bar at the service equipment. Size the grounding electrode conductor in accordance with NEC 250-66.
- F. Conduit Systems:
 - 1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
 - 2. Non metallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
 - 3. Conduit containing only a grounding conductor which is provided for mechanical protection of the conductor shall be bonded to that conductor at the entrance and exit from the conduit.
- G. Feeders and Branch Circuits: Install green equipment grounding conductors as follows:
 - 1. All feeders and power/lighting branch circuits.
 - 2. Receptacle outlets.
 - 3. Motors and motor controllers.
 - 4. Fixed equipment and appliances.
 - 5. Items of equipment where the final connection is made with flexible metal conduit.
 - 6. Additional locations and systems as shown.
- H. Boxes, Cabinets, Enclosures, and Panelboards:
 - 1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass.
 - 2. Provide lugs in each box and enclosure for ground wire termination.
 - 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- I. Motors and Starters:
 - 1. Provide lugs in motor terminal box and starter housing to terminate equipment grounding conductors.
 - 2. In motor control center compartments make ground wire connections to ground bus.
- J. Receptacles are not approved for grounding through their mounting screws. Ground with a green jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- K. Ground lighting fixtures to the green equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

- L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the green equipment grounding conductor.
- M. Raised Floors: Provide bonding of all raised floor components.
- N. Panelboard Bonding: The equipment grounding terminal buses of the normal and essential branch circuit panelboards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than 10 AWG. These conductors shall be installed in rigid metal conduit.

3.4 CORROSION INHIBITORS

When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.5 CONDUCTIVE PIPING

- A. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.
- B. In operating rooms, procedure rooms and intensive care beds, bond the medical gas and vacuum piping, at the outlets, directly to either the room or patient ground bus.

3.6 LIGHTNING PROTECTION SYSTEM

Bond the lightning protection system to the electrical system grounding electrode.

3.7 TELECOMMUNICATIONS SYSTEM

- A. Bond telecommunications system grounding equipment to the electrical grounding electrode system.
- B. Furnish and install all wire and hardware required to properly ground, bond and connect communications raceway, cable tray, metallic cable shields, and equipment to a ground source.
- C. Ground bonding jumpers shall be continuous with no splices. Use the shortest length of bonding jumper possible.
- D. Provide ground paths that are permanent and continuous with a resistance of 1 ohm or less from raceway, cable tray, and equipment connections to the building grounding electrode. The resistance across individual bonding connections shall be 10 milliohms or less.
- E. Below-Grade Grounding Connections: When making exothermic welds, wire brush or file the point of contact to a bare metal surface. Use exothermic welding cartridges and molds in accordance with the manufacturer's recommendations. After welds have been made and cooled, brush slag from the weld area and thoroughly cleaned the joint area. Notify the Resident Engineer prior to backfilling any ground connections.
- F. Above-Grade Grounding Connections: When making bolted or screwed connections to attach bonding jumpers, remove paint to expose the entire contact surface by grinding where necessary; thoroughly clean all connector, plate and other contact surfaces; and apply an appropriate corrosion inhibitor to all surfaces before joining.
- G. Bonding Jumpers:
 - 1. Use insulated ground wire of the size and type shown on the Drawings or use a minimum of 6 AWG insulated copper wire.
 - 2. Assemble bonding jumpers using insulated ground wire terminated with compression connectors.

3. Use compression connectors of proper size for conductors specified. Use connector manufacturer's compression tool.

H. Bonding Jumper Fasteners:

1. Conduit: Fasten bonding jumpers using screw lugs on grounding bushings or conduit strut clamps, or the clamp pads on push-type conduit fasteners. When screw lug connection to a conduit strut clamp is not possible, fasten the plain end of a bonding jumper wire by slipping the plain end under the conduit strut clamp pad; tighten the clamp screw firmly. Where appropriate, use zinc-plated external tooth lock washers.
2. Wireway and Cable Tray: Fasten bonding jumpers using zinc-plated bolts, external tooth lock washers, and nuts. Install protective cover, e.g., zinc-plated acorn nuts on any bolts extending into wireway or cable tray to prevent cable damage.
3. Ground Plates and Bus Bars: Fasten bonding jumpers using two-hole compression lugs. Use tin-plated copper or copper alloy bolts, external tooth lock washers, and nuts.
4. Unistrut and Raised Floor Stringers: Fasten bonding jumpers using zinc-plated, self-drill screws and external tooth lock washers.

3.8 COMMUNICATIONS CABLE GROUNDING

- A. Bond all metallic cable sheaths in multipair communications cables together at each splicing and/or terminating location to provide 100 percent metallic sheath continuity throughout the communications distribution system.
1. At terminal points install a cable shield bonding connector. Provide a screw stud connection for ground wire. Use a bonding jumper to connect the cable shield connector to an appropriate ground source like the rack or cabinet ground bar.
 2. Bond all metallic cable shields together within splice closures using cable shield bonding connectors or the splice case grounding and bonding accessories provided by the splice case manufacturer. When an external ground connection is provided as part of splice closure, connect to an approved ground source and all other metallic components and equipment at that location.

3.9 COMMUNICATIONS SYSTEM CABLE TRAY

- A. Bond the metallic structures of one cable tray in each tray run following the same path to provide 100 percent electrical continuity throughout these cable tray systems as follows:
1. Splice plates provided by the cable tray manufacturer can be used for providing a ground bonding connection between cable tray sections when the resistance across a bolted connection is 10 milliohms or less. The Subcontractor shall verify this loss by testing across one splice plate connection in the presence of the Contractor.
 2. Install a 6 AWG bonding jumper across each cable tray splice or junction where splice plates cannot be used.
 3. When cable tray terminations to cable rack, install 6 AWG bonding jumper between cable tray and cable rack pan.

3.10 WIREWAY GROUNDING

- A. Ground and Bond metallic Wireway systems as follows:
1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.

2. Install insulated 6 AWG bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 16 meters 50 feet).
 3. Use insulated 6 AWG bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.
- B. Use insulated AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 45 feet.
- 3.11 COMMUNICATIONS RACEWAY GROUNDING
- A. Conduit: Use insulated 6 AWG bonding jumpers to ground metallic conduit at each end and to bond at all intermediate metallic enclosures.
 - B. Wireway: Use insulated 6 AWG bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and across all section junctions.
 - C. Cable Tray Systems: Use insulated 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates at each end and approximately every 48 feet.
- 3.12 GROUND RESISTANCE
- A. Services at power company interface points shall comply with the power company ground resistance requirements.
 - B. Below-grade connections shall be visually inspected by the Resident Engineer prior to backfilling. The Contractor shall notify the Resident Engineer 24 hours before the connections are ready for inspection.
- 3.13 GROUND ROD INSTALLATION
- As applicable to the type of construction being performed:
- A. Drive each rod vertically in the earth for not less than ten feet in depth.
 - B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
 - C. Where rock prevents the driving of vertical ground rods, install grounding electrodes in horizontal trenches to achieve the specified resistance.
- 3.14 FIELD INSPECTIONS, OPERATING AND PERFORMANCE TESTS
- A. Inspections (visual/mechanical) and Tests shall be performed during a minimum of two periods (rough and final). Due to project phasing and construction coordination additional periods may be necessary. The electrical system shall be considered ready for the rough Inspections and Tests once the conduit system is complete and all the cables have been pulled. Inspection and Tests requires witness of the VA scheduled 2 weeks in advance, and documentation reports.
 - B. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by an independent agency utilizing a qualified system specialist furnished by the Contractor.
 - C. Verify compliance of all material, workmanship and installation with approved Submittals, Contract Documents, and applicable Codes. Verify nameplate data with drawings and specifications.
 - D. Inspect all installed and reused devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.
 - E. Perform applicable tests indicated in NETA ATS.

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- F. Perform electrical system interground voltage test. Voltage shall not exceed 20 millivolts between receptacle ground reference point and the ground of each receptacle. Testing shall be performed with a precision digital volt meter capable of accurately reading in this range.
- G. Perform grounding system impedance test. Test resistance equal potential grounding, all devices on same circuit outlet to outlet and outlet to local ground. Test each receptacle with no loads plugged into other receptacles sharing the same equipment ground conductor. Impedance shall not exceed 0.10 ohms. Testing shall be performed with either a Woodhead Model 7040 G.L.I.T. or a Hampden Model MVO-60Hz-IT Impedance Tester.
- H. Perform ground system resistance test. Resistance shall not exceed 5 ohms between main ground electrode and ground, and 0.5 ohms point to point equipment frames, system neutrals, derived neutral points. Testing shall be performed with a Hampden Model MVO-1-PB Ground Integrity Tester.
- I. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- J. Perform ground system leakage current test. Connect one probe to a ground reference point, touch the other probe to all exposed conducting surfaces that could be reached by patient/personnel. Demonstrate compliance with NFPA 70 (Art 250), NFPA 99 (Ch 3) and IEC 60601-1 (Table I). Testing shall be performed with an ammeter capable of accurate reading over 10 – 500 microAmps range with a biomedical grade 1,000 ohm test load (Neurodyne Dempsey 431 Safety Analyzer or Biotek Model 170 Safety Analyzer or Instrutek LR 200A).
- K. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- L. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

--- E N D ---

SECTION 26 05 33
RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section includes the furnishing, installation, and connection of conduit, fittings, and boxes to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise except for the use of hospital grade MC cable whips limited in length to light fixtures.
- B. Terminology: Conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.
- B. Section 07 92 00, JOINT SEALANTS: Sealing around penetrations to prevent moisture and water migration.
- C. Section 09 91 00, PAINTING: Identification and painting of conduit and other devices.
- D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.
- E. Section 26 05 26, GROUNDING & BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Manufacturer & Product Qualifications: Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly engaged in manufacturing items of the type specified. Additional or better features, not specifically prohibited by the specifications, but which are parts of the manufacturer's standard commercial product shall be included in the product.
- C. Source Limitations: Each product type shall be the same and the product of a single manufacturer.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data as applicable.
- B. Shop Drawings:
 - 1. Size and location of main feeders.

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2. Size and location of conduit, panelboards, junction boxes, disconnects, fixtures and components.
3. Layout of required conduit penetrations through structural elements.
4. The specific item proposed and its area of application shall be marked on the catalog cuts.

- C. Certifications: Prior to the next Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) 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.

A. Federal Specifications (Fed. Spec.):

- W-C-586C.....Conduit Outlet Boxes, Bodies and Entrance Caps, Electrical; Cast Metal
- W-F-406EFittings for Cable, Power, Electrical and Conduit, Metal, Flexible
- W-F-408D.....Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-Wall (EMT) Type)
- W-J-800E.....Junction Box; Extension Junction Box; Cover Junction Box Steel, Cadmium or Zinc-coated
- FF-S-760A(2).....Strap, Retaining (Metal For Conduit, Pipe, And Cable)
- FFF-S-325Shield, Expansion, Nail, Expansion and Nail, Drive
- INT AMD 3.....Screw (Devices, Anchoring, Masonry)
- WW-C-566CConduit, Metal, Flexible

B. National Fire Protection Association (NFPA):

- 70.....National Electrical Code (NEC)

C. National Electrical Manufacturers Association (NEMA):

- FB1Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

D. Underwriters Laboratories, Inc. (UL):

- 1.....Flexible Metal Electrical Conduit
- 5.....Surface Metal Electrical Raceway and Fittings
- 6.....Rigid Metal Conduit
- 50.....Electrical Cabinets and Boxes
- 360.....Liquid-Tight Flexible Steel Conduit
- 467.....Electrical Grounding and Bonding Equipment
- 514AMetallic Outlet Boxes

514B	Fittings for Conduit and Outlet Boxes
514C	Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
797	Electrical Metallic Tubing
1242	Intermediate Metal Conduit

PART 2 – PRODUCTS

2.1 MATERIAL

- A. Conduit Size: In accordance with the NEC, but not less than 3/4-inch unless otherwise shown. Where permitted by the NEC, 1/2-inch flexible conduit may be used for tap connections to recessed lighting fixtures only.
- B. Conduit:
 - 1. Rigid galvanized steel: Shall conform to UL 6 and ANSI C80.1.
 - 2. Rigid intermediate steel conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
 - 3. Electrical metallic tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 4 inch. Permitted only with cable rated 600 volts or less.
 - 4. Flexible steel conduit (Hospital Grade – commercial Greenfield): Shall conform to UL 1 and Fed. Spec. WW-C-566C. Where permitted by the NEC and UL, may only be used for whip/tap connections to suspended and recessed (requires approval) interior lighting fixtures with lengths limited to six (6) feet extending from a junction box to the fixture.
 - 5. Liquid-tight flexible metal conduit: Shall conform to UL 360. Flexible galvanized steel tubing covered with extruded liquid-tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper bonding conductor wound spirally between the convolutions. Where permitted by the NEC and UL for use on all rotating equipment, motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission with lengths limited to six (6) feet.
 - 6. Surface metal raceway: Shall conform to UL 5.
- C. Conduit Fittings:
 - 1. Rigid galvanized steel and intermediate steel conduit (IMC) fittings:
 - a. Fittings shall meet the requirements of UL 514B and ANSI/NEMA FB1.
 - b. Standard threaded couplings, locknuts, bushings, and elbows conforming to UL 514B, Fed. Spec. WF 408 and only material of steel or malleable iron is acceptable. Integral retractable type IMC couplings are acceptable also.
 - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - d. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
 - e. Erickson and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.

- f. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank coverplates having the same finishes as that of other electrical plates in the room.
 - 2. Electrical metallic tubing (EMT) fittings:
 - a. Fittings shall meet the requirements of UL 514B, ANSI/NEMA FB1.
 - b. Only material of steel or malleable iron is acceptable. Diecast or pressure cast zinc alloy fittings or fittings made of "pot metal" are prohibited.
 - c. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats.

For conduit sizes 2 inches and smaller: Use gland and ring compression type couplings and connectors.

For conduit sizes over 2 inches: Use set screw type couplings with four (4) set screws each. Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
 - d. Indent type connectors or couplings are prohibited.
 - 3. Flexible steel conduit Hospital Grade – fittings:
 - a. Fittings shall meet the requirements of UL 514B, Fed. Spec. WF 406E.
 - b. Only material of steel or malleable iron is acceptable.
 - c. Clamp type, with insulated throat.
 - 4. Liquid-tight flexible metal conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and ANSI/NEMA FB1.
 - b. Only material of steel or malleable iron is acceptable.
 - c. Fittings shall incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
 - 5. Surface metal raceway fittings: As recommended by the raceway manufacturer.
 - 6. Expansion and deflection couplings:
 - a. UL 467 and UL 514B.
 - b. Accommodate 0.75 inch deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
 - d. Jacket: Flexible, corrosion resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.
 - e. Watertight, seismically qualified, corrosion resistant, threaded for and compatible with rigid or intermediate metal conduit.
- D. Conduit Supports:
 - 1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
 - 2. Pipe Straps: Shall conform to Fed. Spec. FF-S-760, Type I, Style A or B.

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3. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 4. Multiple Conduit (trapeze) Hangers: Not less than 1-1/2 by 1-1/2 inch, 12 gage steel, cold formed, lipped channels; with not less than 3/8-inch diameter steel hanger rods.
 5. Solid Masonry and Concrete Anchors: Fed. Spec. FF-S-325; Group III self-drilling expansion shields, or machine bolt expansion anchors Group II, Type 2 or 4, or Group VIII.
- E. Outlet, Junction, and Pull Boxes:
1. Shall conform to UL 50, UL 514A, Fed Spec. W-C-586 and Fed. Spec. W-J-800.
 2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
 3. Sheet metal boxes: Galvanized steel, except where otherwise shown.
 4. Flush mounted wall or ceiling boxes shall be installed with raised covers so that front face of raised cover is flush with the wall. Surface mounted wall or ceiling boxes shall be installed with surface style flat or raised covers.
- F. Wireways: Equip with hinged covers, except where removable covers are shown.
- G. Warning Tape: Standard, 4 mil thick polyethylene 3 inch wide tape detectable type, red with black letters, and imprinted with "CAUTION BURIED ELECTRIC LINE BELOW".

PART 3 – EXECUTION

3.1 PENETRATIONS

- A. Cutting or Holes:
1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Resident Engineer prior to drilling through structural sections.
 2. Cut holes through concrete and masonry in existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Resident Engineer as required by limited working space.
- B. Fire Stop: Where conduits, wireways, other electrical raceways and boxes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between raceways and openings with the fire stop material. **Comply with NEC Article 300.21 in rated walls, floors, ceilings in such a manner that the installation does not contribute to the spread of fire or the products of combustion.**
- C. Waterproofing: At floor, and exterior wall conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Section 07 92 00, JOINT SEALANTS.

3.2 GENERAL REQUIREMENTS

- A. Installation: In accordance with UL, NEC, manufacturer's recommendations, as shown on the drawings and as required by the contract documents. Boxes shall not be installed either above or behind other systems to assure accessibility as determined by the VA.

- B. Essential raceway systems: Install entirely independent of other raceway systems, except where specifically "accepted" by NEC Article 517. Essential raceway systems shall be two (2) hour rated eg, MI cable.
- C. Install conduit as follows:
 - 1. In complete runs before pulling in cables or wires.
 - 2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
 - 3. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
 - 4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
 - 5. Mechanically and electrically continuous.
 - 6. Independently support conduit at 8 feet on center. Do not use other supports i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts.
 - 7. Support within one (1) foot of changes in direction, and within one (1) foot of each enclosure to which connected.
 - 8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
 - 9. Secure conduits to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
 - 10. Unless otherwise indicated on the drawings or specified herein, all conduits shall be installed concealed within finished walls, floors and ceilings.
- D. Conduit Bends:
 - 1. Make bends with standard conduit bending machines.
 - 2. Conduit hickey may be used for slight offsets, and for straightening stubbed out conduits.
 - 3. Bending of conduits with a pipe tee or vise is prohibited.
- E. Layout and Homeruns:
 - 1. Install conduit with wiring, including homeruns, as shown.
 - 2. Contractor shall determine the exact routing and location of systems prior to fabrication and installation.
- F. Deviations: Locations of conduit, boxes and equipment shall be adjusted to accommodate the work with interferences anticipated and encountered. Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted to and have been approved by the Resident Engineer.
- G. Fire Alarm: Fire alarm conduit shall be painted red, a red "top-coated" conduit from the conduit manufacturer may be used in lieu of painted conduit, in accordance with the requirements of Section 28 31 00, FIRE DETECTION & ALARM.

3.3 CONCEALED WORK INSTALLATION

- A. In Concrete:
 - 1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.

2. Align and run conduit in direct lines.
 3. Install conduit through concrete beams only when the following occurs:
 - a. Where shown on the structural drawings.
 - b. As approved by the Resident Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
 4. Installation of conduit in concrete that is less than 3 inches thick is prohibited.
 - a. Conduit outside diameter larger than 1/3 of the slab thickness is prohibited.
 - b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
 - c. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.
 5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the conduits. Tightening set screws with pliers is prohibited.
- B. In Furred or Suspended Ceilings and Walls: All wiring and raceways shall be concealed above furred or suspended ceilings, and recessed in new and/or existing walls unless otherwise noted.
1. Conduit for conductors above 600 volts: Rigid steel.
 2. Conduit for conductors 600 volts and below: Rigid steel, IMC, or EMT. Different type conduits mixed indiscriminately in the same system is prohibited.
 3. Align and run conduit parallel or perpendicular to the building lines.
 4. Tightening set screws with pliers is prohibited.
 5. Flexible metal conduit is not permitted for normal, emergency or essential electrical system circuits. Where permitted by the NEC and UL:
 - a. Flexible metal conduit may only be used for whip/tap connections to suspended and recessed (requires approval) interior lighting fixtures with lengths limited to six (6) feet extending from a junction box to the fixture.
 - b. Liquid-tight flexible metal conduit shall be used for whip/tap connections to all rotating equipment, motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission with lengths limited to six (6) feet extending from a junction box to the equipment.

3.4 EXPOSED WORK INSTALLATION

- A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Conduit for conductors above 600 volts: Rigid steel.
- C. Conduit for conductors 600 volts and below: Rigid steel, IMC, or EMT. Different type of conduits mixed indiscriminately in the system is prohibited.
- D. Liquid-tight flexible metal conduit shall be used for whip/tap connections to all rotating equipment, motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission with lengths limited to six (6) feet.
- E. Align and run conduit parallel or perpendicular to the building lines.
- F. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- G. Support horizontal or vertical runs at not over eight (8) foot intervals.

- H. Surface metal raceways: Use only where shown.
- I. Painting: Paint exposed conduit indicated on the drawings. Refer to Section 09 91 00, PAINTING, for preparation, paint type, and color.

3.5 DIRECT BURIAL INSTALLATION

Not Applicable.

3.6 HAZARDOUS LOCATIONS

- A. Use rigid steel conduit only, notwithstanding requirements otherwise specified in this or other sections of these specifications.
- B. Install UL approved sealing fittings, that prevent passage of explosive vapors, in hazardous areas equipped with explosive proof lighting fixtures, switches, and receptacles, as required by the NEC.

3.7 WET OR DAMP LOCATIONS

- A. Unless otherwise shown, use conduits of rigid steel or IMC.
- B. Provide sealing fittings, to prevent passage of water vapor, where conduits pass from warm to cold locations, i.e., (refrigerated spaces, constant temperature rooms, air conditioned spaces) or similar spaces.
- C. Unless otherwise shown, use rigid steel or IMC conduit within 5 feet of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall include an outer factory coating of 20 mi) bonded PVC or field coat with asphalt before installation. After installation, completely coat damaged areas of coating.

3.8 MOTORS AND VIBRATING EQUIPMENT

- A. Use liquid-tight flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with flexible metal conduit.

3.9 EXPANSION JOINTS

- A. Conduits three (3) inch and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings.
- B. Conduits smaller than three (3) inch couplings, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. In lieu of expansion fittings and with the Resident Engineers approval, provide conduits smaller than three (3) inches with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce five (5) inches vertical drop midway between the ends. Flexible conduit shall have a copper green ground bonding jumper installed.
- C. Install expansion and deflection couplings where shown and required in accordance with the manufacturer's recommendations.
- D. Seismic Supports: Provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a copper green ground bonding jumper installed.

3.10 CONDUIT SUPPORTS

- A. Safe working load shall not exceed 1/4 of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is eight (8) feet on center. Support within one (1) foot of changes in direction, and within one (1) foot of each enclosure to which connected.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 pounds. Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 1/4-inch bolt size and not less than 1-1/8 inch embedment.
 - b. Power set fasteners not less than 1/4-inch diameter with depth of penetration not less than three inches.
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts are permitted. Bolts supported only by plaster are not acceptable.
- G. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- H. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking. Bolts supported only by plaster or gypsum wallboard are prohibited.
- I. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- J. Spring steel type supports or fasteners are prohibited.
- K. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
 - 1. Mount flush. Recess into existing structure where necessary.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling operations.
- C. Boxes shall be installed at conveniently accessible locations viewable in a direct line of site parallel and/or perpendicular to the building lines as determined by the Government. Where the Government determines that the Contractor has installed boxes not conveniently accessible for operation and maintenance, the boxes shall be removed and reinstalled as directed at no cost to the Government.

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- D. Remove only knockouts as required, and plug unused openings. Use threaded plugs for cast metal boxes, and snap-in metal covers for sheet metal boxes.
- E. Outlet boxes in the same wall mounted back-to-back are prohibited. Gaps between outlet boxes and wall/ceiling material shall be less than 1/8-inch as measured from the edge of the outlet box.
- F. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.
- G. Stencil or install phenolic nameplates on box covers with panel and circuit designation.
- H. Paint boxes and covers to match color code of conduit service.

3.12 COMMUNICATION CONDUIT (Telephone/Data)

- A. Install the communication, conduit at each designated location in 1 inch EMT conduit from a recessed double duplex outlet box with duplex single gang trim piece to the corridor suspended ceiling area.
- B. Conduit runs shall contain no more than four-quarter turns and no junction/pull boxes.
- C. The communication system shall be provided with sleeves through each wall above the ceiling line to the communication closet.
- D. Conduit/Sleeve ends shall terminate with an insulated bushing and a fire seal plug. All conduit/sleeves shall be sealed after voice/data cables are installed with non-hardening fire resistant sealant to prevent the entrance of moisture, gases, and meet fire resistance requirements.
- E. Vertical conduits/sleeves through closet floors shall terminate not less than 3 inches below the floor, and not less than 3 inches below the ceiling of the floor below. Where coring/drilling is necessary for vertical conduits, locate holes so as not to impair structural section members such as ribs or beams.
- F. Each communication run shall be piped with EMT conduit not less than the sizes shown on the drawings. Minimum radius of voice/data conduit bends shall be as follows (special long radius):

<u>Conduit Size</u> (Inches)	<u>Conduit Bend Radius</u> (Inches)
1 minimum	6 minimum
1	9
1-1/4	14
1-1/2	17
2	21
2-1/2	25
3	31

- G. Furnish and pull wire in all communication conduits/sleeves. Cables from the communication closet to the point of termination outlet boxes shall be installed in either the corridor raceway system or supported using a facility approved method.
- H. Provide nylon pull cords in all empty conduit runs from the corridor to the point of termination outlet box. Provide blank covers for unused locations.
- I. Existing communication cables that are not being reused shall be tagged with the Building – Floor – Jack number then coiled and hung above the ceiling line in the corridor before removal. Provide the Project Engineer with a list of the tagged cables not being reused for assessment.

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3.13 IDENTITY LABELING

- A. Identify systems, unless specified otherwise, on conduit and boxes, concealed, exposed, above removable ceilings, in accessible spaces, interstitial spaces, and behind access panels. Legends shall be placed to be clearly visible from all positions.
- B. Place a color coded 6 inch wide band 360° surround label every 4 feet on center of conduit run.
- C. Paint boxes and covers to match color code of conduit service. Stencil or install phenolic nameplates on box covers with panel and circuit designation.
- D. Conduit containing high voltage over 600 volts: Paint entire length Federal Safety Orange. In addition, conduits carrying high voltage require labels in compliance with OSHA requirements. Provide labels designating conductor voltage Class Rating (5000, 15000, or 25000 as applicable) and not exact voltage. Labels shall use 50 mm (2 inch) high black numbers and letters with yellow background and black border. Labels shall contain the words "Danger High Voltage Class 5000 or 15000 or 25000". Labels shall be placed at maximum 8 foot intervals, and where conduits pass through walls and floors.
- E. Refer to Section 09 91 00, PAINTING, for preparation and paint type.
- F. All conduits and boxes (new, modified, relocated, rewired) shall be labeled.
- G. Painting or using vinyl tape according to the following schedule:

<u>COLOR</u>	<u>APPLICATION</u>
Red	Fire Alarm
Orange	Emergency
Blue	Normal 480/277V
Brown	Normal 120/208V
Black	ECC System (under 120V)
Yellow	Medical Gas Alarms
White	Nurse Call System
Orange/Red	Life Safety
Orange/Blue	Critical
Orange/Brown	Equipment (Critical type)

3.14 FIELD INSPECTIONS AND TESTS

- A. Inspections and Tests shall be performed during a minimum of two periods. Due to project phasing and construction coordination additional periods may be necessary. The electrical system shall be considered ready for the rough Inspections and Tests once the conduit system is complete and all the cables have been pulled. Inspection and Tests requires witness of the VA scheduled 2 weeks in advance, and documentation reports.
- B. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by an independent agency utilizing a qualified system specialist furnished by the Contractor.
- C. Verify compliance of all material, workmanship and installation with approved Submittals, Contract Documents, and applicable Codes. Verify nameplate data with drawings and specifications.
- D. Inspect all installed and reused devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.

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- E. Verify size, quantity, location of conduits, boxes, disconnects in accordance with NEC.
- F. Verify the conduit and box supports in accordance with contract requirements.
- G. Verify pull, junction, disconnect box accessibility.
- H. Verify length and use of flexible conduit.
- I. Verify application of the conduit system color code and labeling requirements.
- J. Verify tightness of accessible bolted connections in accordance with published data.
- K. Verify tightness of compression-applied connectors in accordance with published data.
- L. Verify circuit and voltage tag designation on cables at each manhole, handhole, disconnect, pull and junction box.
- M. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- N. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

--- E N D ---

SECTION 26 08 00
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 26.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. A Commissioning Agent (CxA) appointed by the Department of Veterans Affairs will manage the commissioning process.

1.2 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS
- B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.3 SUMMARY

- A. This Section includes requirements for commissioning the electrical systems, subsystems and equipment. This Section supplements the general requirements specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental Energy and Economic Performance.
- C. The commissioning activities have been developed to support the United States Green Building Council (USGBC) LEED™ rating program and to support delivery of project performance in accordance with the Contract Documents developed with the approval of the VA.
 - 1. Commissioning activities and documentation for the LEED™ section on “Energy and Atmosphere” prerequisite of “Fundamental Building Systems Commissioning”.
 - 2. Commissioning activities and documentation for the LEED™ section on “Energy and Atmosphere” requirements for the “Enhanced Building System Commissioning” credit.
 - 3. Activities and documentation for the LEED™ section on “Measurement and Verification” requirements for the Measurement and Verification credit.
- D. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more specifics regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

1.4 DEFINITIONS

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

1.5 COMMISSIONED SYSTEMS

- A. Commissioning of a system or systems specified in this Division 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.

1.6 The following Electrical systems will be commissioned:

1. Normal Power Distribution Systems (Grounding tests, coordination study review, major circuit breaker settings, meters and gages, and controls).
2. Life Safety Power Distribution Systems (Automatic transfer on loss of normal power, grounding tests, coordination study review, major circuit breaker settings, meters and gages, and controls).
3. Lighting Controls (Control system hardware and software, scene settings, zone settings, occupancy sensor interface, and unoccupied cycle control).

1.7 SUBMITTALS

- A. The commissioning process requires review of selected Submittals. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the Resident Engineer prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.
- B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRE-FUNCTIONAL CHECKLISTS

- A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

3.2 CONTRACTORS TEST

- A. Contractor tests as required by other sections of Division 26 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. The Commissioning Agent will witness selected Contractor tests. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.3 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:

- A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

3.4 TRAINING OF VA PERSONNEL

- A. Training of the VA's operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Resident Engineer after submission and approval of formal training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 26 Sections for additional Contractor training requirements.

----- END -----

SECTION 26 09 23
LIGHTING CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation and connection of the lighting controls.

1.2 RELATED WORK

- A. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Interface of lighting controls with HVAC control systems.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General requirements that are common to more than one section of Division 26.
- C. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.
- E. Section 24 26 16, PANELBOARDS: panelboard enclosure and interior bussing used for lighting control panels.
- F. Section 26 27 26, WIRING DEVICES: Wiring devices used for control of the lighting systems.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Product Data: For each type of lighting control, submit the following information.
 - 1. Manufacturer's catalog data.
 - 2. Wiring schematic and connection diagram.
 - 3. Installation details.
- C. Manuals:
 - 1. Submit, simultaneously with the shop drawings companion copies of complete maintenance and operating manuals including technical data sheets, and information for ordering replacement parts.
 - 2. Two weeks prior to the final inspection, submit four copies of the final updated maintenance and operating manuals, including any changes, to the Resident Engineer.
- D. Certifications:
 - 1. Two weeks prior to final inspection, submit four copies of the following certifications to the Resident Engineer:
 - a. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. Green Seal (GS):
 - GC-12 Occupancy Sensors
- C. Illuminating Engineering Society of North America (IESNA):
 - IESNA LM-48..... Guide for Calibration of Photoelectric Control Devices
- D. National Electrical Manufacturer's Association (NEMA)
 - C136.10 American National Standard for Roadway Lighting Equipment-Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
 - ICS-1..... Standard for Industrial Control and Systems General Requirements
 - ICS-2..... Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
 - ICS-6..... Standard for Industrial Controls and Systems Enclosures
- E. Underwriters Laboratories, Inc. (UL):
 - 20..... Standard for General-Use Snap Switches
 - 773..... Standard for Plug-In Locking Type Photocontrols for Use with Area Lighting
 - 773A Nonindustrial Photoelectric Switches for Lighting Control
 - 98..... Enclosed and Dead-Front Switches
 - 917..... Clock Operated Switches

PART 2 – PRODUCTS

2.1 ELECTRONIC TIME SWITCHES

- A. Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
 - 1. Contact Configuration: //SPST// //DPST// //DPDT//.
 - 2. Contact Rating: //30-A inductive or resistive, 240-V ac// //20-A ballast load, 120/240-V ac//.
 - 3. Astronomical Clock: Capable of switching a load on at sunset and off at sunrise, and automatically changing the settings each day in accordance with seasonal changes of sunset and sunrise. Additionally, it shall be programmable to a fixed on/off weekly schedule.
 - 4. Battery Backup: For schedules and time clock.

2.2 ELECTROMECHANICAL-DIAL TIME SWITCHES

- A. Electromechanical-dial time switches; complying with UL 917.

1. Contact Configuration: //SPST// //DPST// //DPDT//.
2. Contact Rating: //30-A inductive or resistive, 240-V ac// //20-A ballast load, 120/240-V ac//.
3. Wound-spring reserve carryover mechanism to keep time during power failures.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Solid state, with //SPST// //DPST// dry contacts rated for 1800 VA tungsten or 1000 VA inductive, complying with UL 773A.
 1. Light-Level Monitoring Range: 1.5 to 10 fc [16.14 to 108 lx], with adjustable turn-on and turn-off levels.
 2. Time Delay: 15-second minimum.
 3. Surge Protection: Metal-oxide varistor.
 4. Mounting: Twist lock, with base-and-stem mounting or stem-and-swivel mounting accessories as required.

2.4 TIMER SWITCHES

- A. Digital switches with backlit LCD display, 120/277 volt rated, fitting as a replacement for standard wall switches.
 1. Compatibility: Compatible with all ballasts.
 2. Warning: Audible warning to sound during the last minute of "on" operation.
 3. Time-out: Adjustable from 5 minutes to 12 hours.
 4. Faceplate: Refer to wall plate material and color requirements for toggle switches, as specified in Section 26 27 26, WIRING DEVICES.

2.5 CEILING-MOUNTED PHOTOELECTRIC SWITCHES

- A. Solid-state, light-level sensor unit, with separate relay unit.
 1. Sensor Output: Contacts rated to operate the associated relay. Sensor shall be powered from the relay unit.
 2. Relay Unit: Dry contacts rated for 20A ballast load at 120V and 277V, for 13A tungsten at 120V, and for 1 hp at 120V.
 3. Monitoring Range: //10 to 200 fc [108 to 2152 lx]// //100 to 1000 fc [1080 to 10 800 lx]//, with an adjustment for turn-on and turn-off levels.
 4. Time Delay: Adjustable from 5 to 300 seconds, with deadband adjustment.
 5. Indicator: Two LEDs to indicate the beginning of on-off cycles.

2.6 SKYLIGHT PHOTOELECTRIC SENSORS

- A. Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight; with separate relay unit.
 1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 2. Relay Unit: Dry contacts rated for 20A ballast load at 120V and 277V, for 13A tungsten at 120V, and for 1 hp at 120V.
 3. Monitoring Range: 1000 to 10,000 fc [10,800 to 108,000 lx], with an adjustment for turn-on and turn-off levels.
 4. Time Delay: Adjustable from 5 to 300 seconds, with deadband adjustment.

5. Indicator: Two LEDs to indicate the beginning of on-off cycles.

2.7 INDOOR OCCUPANCY SENSORS

- A. Wall- or ceiling-mounting, solid-state units with a power supply and relay unit, suitable for the environmental conditions in which installed.
 1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a 1 to 15 minute adjustable time delay for turning lights off.
 2. Sensor Output: Contacts rated to operate the connected relay. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20A ballast load at 120V and 277V, for 13A tungsten at 120V, and for 1 hp at 120V.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Manual/automatic selector switch.
 8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc [21.5 to 2152 lx]; keep lighting off when selected lighting level is present.
 9. Faceplate for Wall-Switch Replacement Type: Refer to wall plate material and color requirements for toggle switches, as specified in Section 26 27 26, WIRING DEVICES.
- B. Dual-technology Type: Ceiling mounting; combination PIR and ultrasonic detection methods, field-selectable.
 1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of 6-inch [150mm] minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. [232 sq. cm], and detect a person of average size and weight moving not less than 12 inches [305 mm] in either a horizontal or a vertical manner at an approximate speed of 12 inches/s [305 mm/s].
 3. Detection Coverage: as scheduled on drawings.

2.8 OUTDOOR MOTION SENSOR (PIR)

- A. Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F (minus 40 to plus 54 deg C).
 1. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a 1 to 15 minute adjustable time delay for turning lights off.
 2. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outdoor junction box.
 - b. Relay: Internally mounted in a standard weatherproof electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

3. Bypass Switch: Override the on function in case of sensor failure.
 4. Automatic Light-Level Sensor: Adjustable from 1 to 20 fc [11 to 215 lx]; keep lighting off during daylight hours.
- B. Detector Sensitivity: Detect occurrences of 6-inch [150mm] minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. [232 sq. cm].
- C. Detection Coverage: as scheduled on drawings.
- D. Individually Mounted Sensor: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
1. Relay Unit: Dry contacts rated for 20A ballast load at 120V and 277V, for 13A tungsten at 120V, and for 1 hp at 120V.
 2. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

2.9 //LIGHTING CONTROL PANEL – RELAY TYPE

- A. Controller: Comply with UL 508; programmable, solid-state, astronomic 365-day control unit with non-volatile memory, mounted in preassembled relay panel with low-voltage-controlled, latching-type, single-pole lighting circuit relays. Controller shall be capable of receiving inputs from sensors and other sources, and capable of timed overrides and/or blink-warning on a per-circuit basis. Controller communication protocol shall be compatible with the building automation system specified in SECTION 23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. Where indicated, a limited number of digital or analog, low-voltage control-circuit outputs shall be supported by control unit and circuit boards associated with relays.
- B. Cabinet: Steel with hinged, locking door. Barriers separate low-voltage and line-voltage components.
- C. Directory: Identifies each relay as to load controlled.
- D. Control Power Supply: Transformer and full-wave rectifier with filtered dc output.
- E. Single-Pole Relays: Mechanically held unless otherwise indicated; split-coil, momentary-pulsed type, rated 20 A, 125-V ac for tungsten filaments and 20 A, 277-V ac for ballasts, 50,000 cycles at rated capacity.//

2.10 LIGHTING CONTROL PANEL – CIRCUIT BREAKER TYPE

- A. Controller: Panelboard mounted in compliance with UL 916, programmable, solid-state, astronomic 365-day timing and control unit with non-volatile memory. Controller shall be integral to panelboard as specified in Section 26 24 16, PANELBOARDS. Controller shall be capable of receiving inputs from sensors and other sources, and capable of timed overrides and/or blink-warning on a per-circuit basis. Controller communication protocol shall be compatible with the building automation system specified in SECTION 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. Panelboard shall use low-voltage-controlled, electrically operated molded-case branch circuit breakers or molded-case branch circuit breakers with switching accessories. Circuit breakers and a limited number of digital or analog, low-voltage control-circuit outputs shall be individually controlled by control module. Panelboard shall also comply with Section 24 26 16, PANELBOARDS.
- B. Electrically Operated, Molded-Case Circuit-Breaker Panelboard: Per Section 24 26 16, PANELBOARDS.
- C. Electrically Operated, Molded-Case Circuit Breakers: Per Section 26 24 16, PANELBOARDS.
- D. Switching Endurance Ratings: Rated at least 20,000 open and close operations under rated load at 0.8 power factor.//

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC, manufacturer's instructions and as shown on the drawings or specified.
- B. Aim outdoor photocell switch according to manufacturer's recommendations. Set adjustable window slide for 1 footcandle photocell turn-on.
- C. Aiming for wall-mounted and ceiling-mounted motion sensor switches shall be per manufacturer's recommendations.
- D. Set occupancy sensor "on" duration to //5// //10// //15// minutes.
- E. Locate light level sensors as indicated and in accordance with the manufacturer's recommendations. Adjust sensor for the scheduled light level at the typical work plane for that area.
- F. Label time switches and contactors with a unique designation.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations.
- B. Upon completion of installation, conduct an operating test to show that equipment operates in accordance with requirements of this section.
- C. Test for full range of dimming ballast and dimming controls capability. Observe for visually detectable flicker over full dimming range.
- D. Test occupancy sensors for proper operation. Observe for light control over entire area being covered.
- E. Program lighting control panels per schedule on drawings.
- F. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory-authorized technician who will verify all adjustments and sensor placements.

3.3 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the lighting control devices are in good operating condition and properly performing the intended function.

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SECTION 26 27 26
WIRING DEVICES

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of wiring devices.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.
- B. Section 26 05 21, LOW VOLTAGE ELECTRICAL CONDUCTORS & CABLES (600 Volts & Below): Cables and wiring.
- C. Section 26 05 26, GROUNDING & BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and providing a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Manufacturer & Product Qualifications: Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly engaged in manufacturing items of the type specified. Additional or better features, not specifically prohibited by the specifications, but which are parts of the manufacturer's standard commercial product shall be included in the product.
- C. Source Limitations: Each product type shall be the same and the product of a single manufacturer.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data as applicable.
- B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 2. Include electrical ratings, dimensions, mounting details, construction materials, grade, and termination information.
- C. Operation and Maintenance Manuals: Submit in accordance with Article, INSTRUCTION MANUALS, in Section 01 00 00, GENERAL REQUIREMENTS. Complete operating and maintenance manuals shall be provided including technical data sheets, wiring diagrams, and information for ordering replacement parts. Deliver copies to the Resident Engineer not less than 4 weeks prior to final inspection.

- D. Certifications: Prior to the next Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.

1.5 APPLICABLE PUBLICATIONS

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.

- A. Federal Specifications (Fed. Spec.):
W-C-596 Electric Power Connector, Plugs, Receptacles and Cable Outlets
W-S-896 Flush Mounted Toggle and Lock Switches
- B. National Fire Protection Association (NFPA):
70..... National Electrical Code (NEC)
- C. National Electrical Manufacturers Association (NEMA):
WD 1..... General Requirements for Wiring Devices
WD 3..... A/C General-Use Snap Switches
WD 5..... Specific-Purpose Wiring Devices
WD 6..... Wiring Devices – Dimensional Requirements
- D. Underwriter's Laboratories, Inc. (UL):
5..... Surface Metal Raceways and Fittings
20..... General-Use Snap Switches
231..... Power Outlets, Electrical
467..... Grounding and Bonding Equipment
498..... Attachment Plugs and Receptacles
514..... Outlet Boxes and Fittings
943..... Ground Fault Circuit Interrupters
1010..... Receptacle - Plug Combinations, Electrical, For Use In Hazardous Locations
1054..... Switches, Special Use

PART 2 – PRODUCTS

2.1 RECEPTACLES

- A. General: All receptacles shall be listed by Underwriters Laboratories, Inc., as hospital grade and conform to NEMA WD1.
1. Mounting straps shall be plated steel, with beak-off plaster ears and shall include a self grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
 2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (4 minimum) and side wiring from four captively held binding screws.

- B. Duplex receptacles shall be single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD6. The duplex type shall have break-off feature for two circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.
 - 1. Bodies shall be Ivory in color.
 - 2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be un-switched.
 - 3. Duplex receptacle on emergency circuits:
 - a. Bodies shall be red in color. Wall plates shall be red with the word "Emergency" engraved 1/4-inch white or black letters on cover.
 - b. In rooms without emergency powered general lighting, the emergency receptacles shall be of self-illuminating type.
 - 4. Duplex receptacles with ground fault interrupter: Shall be an integral unit suitable for mounting in a standard outlet box.
 - a. Ground fault interrupter, shall be hospital grade with indicator light and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20 ampere branch circuit.
 - b. Device shall have nominal sensitivity to ground leakage current of 5 milliamperes and shall function to interrupt the current supply for any value of ground leakage current above 5 milliamperes on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.
 - 5. Safety Type Duplex Receptacles: Not Applicable.
 - 6. Isolated Ground Type Duplex Receptacles:
 - a. Bodies shall be orange in color.
 - b. Shall be hospital grade and UL listed as "Isolated Ground".
- C. Receptacles 20, 30 and 50 Ampere, 250 Volt: Shall be complete with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring hinged flap. The weatherproof integrity shall not be affected when heavy duty specification or hospital grade attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.

2.2 SWITCHES AND DIMMERS

- A. Toggle switches: Shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles shall be ivory in color unless otherwise specified. The rocker type switch is not acceptable.
 - 1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
 - 2. Switches installed in hazardous areas shall be explosion proof type in accordance with the NEC and as shown on the drawings.

3. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meeting the requirements of NEMA WD1, Heavy-Duty and UL 20.
 4. Ratings:
 - a. 120 volt circuits: 20 ampere at 125 volts AC.
 - b. 277 volt circuits: 20 ampere at 277 volts AC.
 5. Incorporate barriers between switches with multigang outlet boxes where required by the NEC.
 6. Light switches shall be mounted on the striker plate side of doors.
 7. Switches connected to isolated type electrical power system shall be double pole.
 8. All toggle switches shall be of the same manufacturer.
- B. Incandescent modular dimmers: Shall be encapsulated electronic type with bodies of phenolic compound. Toggle pads shall be ivory in color unless otherwise specified.
1. Incandescent dimming system shall be 2000 watt modular type, with capability for "slaving" larger loads from the "Master". System shall have capability of adding additional "Slaves", controlled from the original basic dimmer "Master". All units shall track with "Master". Control units shall be single-phase manual control or three-phase manual motorized control as shown on the drawings. Dimmers shall have low and intensity adjustment and built-in transient voltage protection and fused on the load side. All remote mounted units shall be completely enclosed in integral metal housing. "Master", "Slaves" and controls shall be of the same manufacturer.
 - a. Leviton MDI10-1 or equal with LED brightness level display incandescent rated for 1000 watts.
 - b. Lutron 11001-P micro-dim or equal with LED level display incandescent rated for 1000 watts with Lutron 10000-P or equal for multi-point control shall be utilized where applicable.
 2. Ratings: Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD1.
 - a. 120 volt circuits: 20 ampere at 125 volts AC.
 - b. 277 volt circuits: 20 ampere at 277 volts AC.
 3. The switches shall be mounted on the striker plate side of doors.
 4. All dimming switches shall be of the same manufacturer.
- C. Fluorescent lamp dimmers: Shall be totally enclosed tumbler type with bodies of phenolic compound. Control knob shall be ivory in color unless otherwise specified.
1. Switches shall be specification grade and shall be capable of raising and lowering the lighting from completely off at extreme counter-clockwise rotation, to full intensity. Switches shall include an "OFF" position.
 - a. Leviton IP710-DLZ or equal with LED display electronic low-voltage rated for 1200 VA.
 2. Switches shall have low end intensity adjustment and maintain full load rating even when two or more units are installed adjacent to one another. Dimming ballast shall be provided for each F32 rapid start lamp or pair of lamps.
 3. Switches shall have adequate capacity for the load served and the environment in which installed, shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD1.

4. All switches shall be of the same manufacturer.
5. All dimmers shall be of the same manufacturer.

2.3 OCCUPANT SENSOR CONTROL FOR INDOOR LIGHTING SYSTEMS

- A. General: An active or passive sensor shall be utilized to control the "On/Off" actuation of fluorescent or incandescent lighting loads. It shall provide control of an isolated set of contacts on exposure to a perceived change in environmental conditions indicating the presence or absence of one or more persons. It shall maintain the contacts closed in the presence of continued changes at similar intensity and rate. It shall open the contacts at a nominal time after the changes cease.
- B. Passive Sensor System: Sensor(s) shall react to changes of radiated infrared energy, indicating the activity of one or more human bodies in the area covered:
 1. Range of detection: The sensor(s) shall provide effective coverage of a room, sensing the presence of one or more people in the room in order to turn the lights on. The ceiling mounted sensor's area of coverage shall be approximately a 14 feet diameter circle at 6 feet away. Provide sufficient units to give full coverage as measured 30 inches above the floor. A field of view adjustment feature shall be provided to allow orientation to various room operating conditions.
 2. Sensor placement: Locate the sensor(s) in accordance with the manufacturer's recommendations to maximize energy savings by avoiding nuisance activation due to sudden temperature or air flow changes. Locate the units within 6 feet horizontally of work stations or major points of activity, including the center of room entrance doors.
- C. Active Sensor System: Sensor(s) shall react to reflective changes to generated ultrasonic radiation, indicating the activity of one or more persons in the area covered.
 1. Range of detection: On ceilings below twelve feet in height, a single direction sensor shall cover approximately 30 feet by 30 feet area; a two directional unit a 60 feet by 30 feet area; and a two way corridor unit a total distance of 90 feet. The sensors shall be equipped with a concealed but accessible sensitivity control to tune the unit to specific room conditions.
 2. Sensor placement: Locate the sensors in accordance with the manufacturer's recommendations to maximize energy savings by avoiding nuisance activation due to predictable non human motion activities. Give particular attention to work station or major areas of activity and the coverage of room entrance doors.
- D. Timing/Function: Shall not be user adjustable. Lighting shall remain on with one or more persons within the covered area. The system shall be factory set to maintain lights on for a minimum of 8 minutes and not longer than 12 minutes after the area of coverage is vacated. For testing purposes, there shall be a means to change the pre-set time delay to 30 seconds or less.
- E. Control Unit: The system shall have a switching relay(s) capable of switching the fluorescent or incandescent loads as required. Contacts shall be rated at a minimum of 15 Amps at voltages to 277, with expected cycles of operation in excess of 100K. Power derived from a current limiting 24 volt transformer shall power the system and the unit must be packaged for installation on a standard 4 inch by 4 inch NEMA box enclosure. The unit shall be wired through a conventional wall switch to provide an over ride system "Off" and active "Off On" functioning.
- F. Field Wiring: The wiring between the control unit and sensor(s) shall be an insulated multi-conductor, Number 22 gauge Poly Vinyl Chloride (PVC) jacketed cable.

2.4 WALL PLATES

- A. Wall plates for switches and receptacles shall be mid-size high impact self-extinguishing smooth nylon thermoplastic. Oversize plates will not be acceptable.
- B. Normal power plates shall be ivory. Emergency power plates shall be red. Emergency plates shall also be engraved with "EMERGENCY" in addition to the panel and circuit number.
- C. Standard NEMA design so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.
- D. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- E. All receptacle and light switch cover plates shall have the electrical panel number and circuit number engraved in block utilizing the hospital numbering system. New cover plates on existing devices shall match the new work being performed.

2.5 SURFACE MULTIPLE-OUTLET ASSEMBLIES

- A. Assemblies shall conform to the requirements of NFPA 70 and UL 5.
- B. Shall have the following features:
 - 1. Enclosures:
 - a. Thickness of steel shall be not less than 0.040 inch steel for base and cover. Nominal dimension shall be 1-1/2 by 2-3/4 inches with inside cross sectional area not less than 3.5 square inches. The enclosures shall be thoroughly cleaned, phosphatized and painted at the factory with primer and the manufacturer's standard baked enamel or lacquer finish.
 - 2. Receptacles shall be duplex, hospital grade, see paragraph 'RECEPTACLES' in this section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
 - 3. Unless otherwise shown on drawings, spacing of the receptacles along the strip shall be 6 inches on centers.
 - 4. Wires within the assemblies shall be not less than No. 12 AWG copper, with 600 volt ratings.
 - 5. Installation fittings shall be designed for the strips being installed including bends, offsets, device brackets, inside couplings, wire clips, and elbows.
 - 6. Bond the strips to the conduit systems for their branch supply circuits.

2.6 COMMUNICATION DEVICES (Telephone/Data)

- A. The 4-port single gang Ortronics faceplate standard shall be used at each designated location. Provide blank covers for unused locations.
- B. Voice/Data 4-port single gang ivory faceplates manufactured by Ortronics with Model Clarity Category 6 TracJack T568A/B workstation modules using matching color-coded voice/data icons ... Jack A – Yellow; Jack B – Blue; Jack C – White, Jack D – Green.
- C. Patch panels manufactured by Ortronics Model Clarity Category 6 supporting T568A/B wiring schemes with 8-port groupings using matching color-coded voice/data icons ... Jack A – Yellow; Jack B – Blue; Jack C – White, Jack D – Green. Patch panel quantity/capacity/size shall be suitable for the system being installed and compatible with the facility communication racks ... CPI Chatsworth Products – 73 inch length, 15 inch depth, 95 inch height with horizontal tray.

2.7 CARD ACCESS

- A. Card Access system shall interface with and match the existing in the facility. Program each device into the facility system. Card Access system installation shall be performed in accordance with the requirements of the facility service company of record.
- B. Card Access system shall consist of a card reader mounted next to the door it serves, door contact to monitor the door position and an electrically operated mortise lockset Best Lockset Model 45HW7DEU15J626RH-RQE with an 8 wire transfer hinge – Stanley Part #CEFBB179-58. Wiring and conduit shall be installed from the door frame for connection of the card reader, door contact and lockset to an M – 8 interface panel provided by the Contractor and mounted on a 3/4-inch fire rated plywood panel. Location of the interface panel which interconnects with the facility master system shall be approved by the Project Engineer. Contractor is responsible for all wiring, conduit, devices, labeling and programming for a fully functional system. Contractor shall utilize the facility service company of record as a subcontractor to provide a complete and fully functional system.
- C. Verify with the facility service company of record for the extent of work required to connect into the system. JP – Barry Security Sys (Red Hawk) (1-800-273-1423) of Lawrence, MA

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC, and as required by the contract documents.
- B. Each circuit shall have its own neutral. Do not combine neutral wires with other circuits.
- C. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and connected to the green equipment grounding conductor.
- D. Light switches shall be mounted on the striker plate side of door/room openings and shall be horizontally placed within 18 inches of the opening.
- E. All switch and receptacle plates within the construction boundary shall be engraved with the circuit and panel number feeding the device utilizing the hospital nomenclature. Contractor shall verify existing quantities and type of device plates required to be replaced. Contractor shall trace all circuits (including existing) to verify proper labeling and load distribution.
- F. Install communication system faceplates and jacks at each designated location. Install patch panels in the communication closet. Connect devices to the communication cable system. Install a permanent label on each faceplate designating the Building – Floor – Jack number. Label the patch panel with the corresponding jack number. Provide the Project Engineer a list of the labeled faceplates with room numbers indicated.
- G. At the final inspection, a factory certified representative of the Duress, Code Blue/Green, Card Access systems shall perform the tests specified herein under Article, FIELD QUALITY ASSURANCE. The representative shall demonstrate that the system functions properly in every respect in the presence of a qualified VA representative.

3.2 FIELD QUALITY ASSURANCE

- A. Acceptance Testing: Contractor shall notify the Resident Engineer in writing seven (7) days after the pretest has been completed and 30 days prior to the date acceptance testing is expected to begin. The system shall be tested in the presence of the Resident Engineer. Contractor shall verify that the total system meets all of the requirements of the specification and complies with all appropriate standards.

- B. Communication Device systems shall interface with the facility existing systems where applicable. Communication Device system installation shall be performed in accordance with the requirements of the facility. Contractor shall provide all labeling, termination, testing at both ends of the cables. Final connections and programming of the Communication Devices to the facility system shall be performed by the facility.
- C. Card Access system shall interface with the facility existing system. Card Access system installation shall be performed in accordance with the requirements of the facility service company of record. Final connections and programming of the Card Access components shall be performed by the facility service company of record
 - 1. Verify with the facility service company of record for the extent of work required to connect into the system.
 - 2. Card Access at JP is located in the Bldg 1 first floor security/police office – Vendor: Barry Security Sys (Red Hawk) of Lawrence, MA.

3.3 FIELD INSPECTIONS, OPERATING AND PERFORMANCE TESTS

- A. Inspections (visual/mechanical) and Tests shall be performed during a minimum of two periods (rough and final). Due to project phasing and construction coordination additional periods may be necessary. The electrical system shall be considered ready for the rough Inspections and Tests once the conduit system is complete and all the cables have been pulled. Inspection and Tests requires witness of the VA scheduled 2 weeks in advance, and documentation reports.
- B. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by an independent agency utilizing a qualified system specialist furnished by the Contractor.
- C. Verify compliance of all material, workmanship and installation with approved Submittals, Contract Documents, and applicable Codes. Verify nameplate data with drawings and specifications.
- D. Inspect all installed and reused devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.
- E. Verify tightness of accessible bolted connections with published data.
- F. Verify application of the device and cover plate color code and labeling requirements.
- G. Verify circuit continuity, hot/neutral polarity, operating voltage, voltage/current ratings.
- H. Verify that all wiring is connected properly, clear of ground faults, shorts, open circuit defects.
- I. Verify blade & ground retention forces of each receptacle are not less than 20 oz. & 10 oz. respectively.
- J. Verify that fuse sizes & types are in accordance with the drawings, short-circuit studies, and coordination study.
- K. Verify voltage difference between the neutral conductor and the equipment ground (ground contacts of the receptacle) is 4.5 volts (3 volts feeder and 1.5 volts branch circuit).
- L. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- M. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

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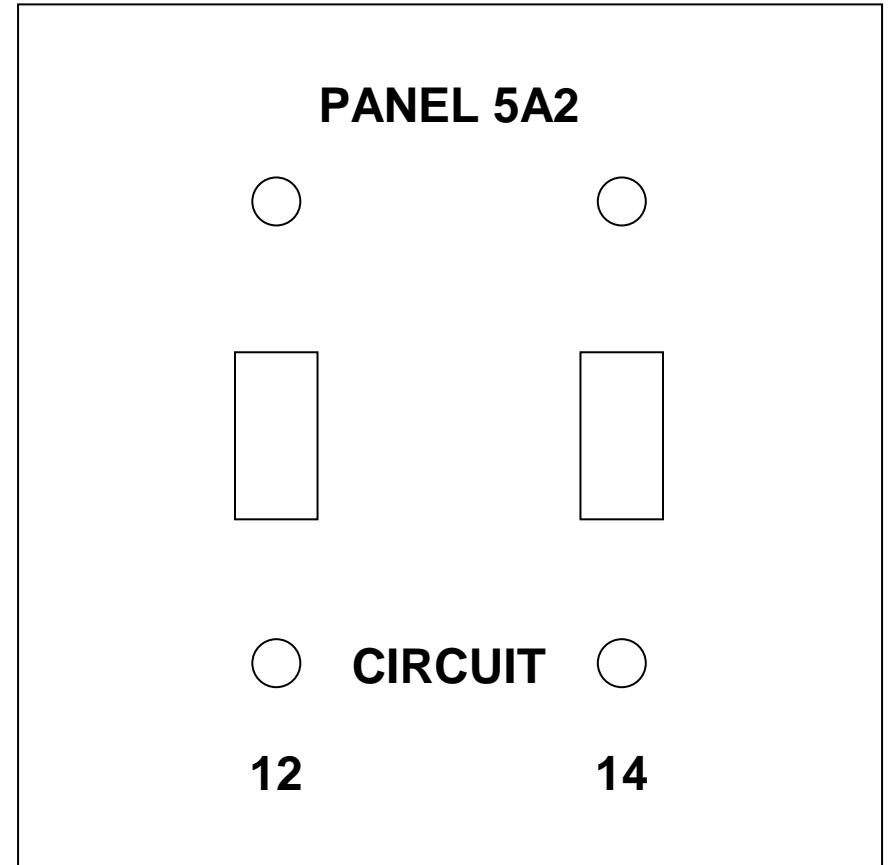
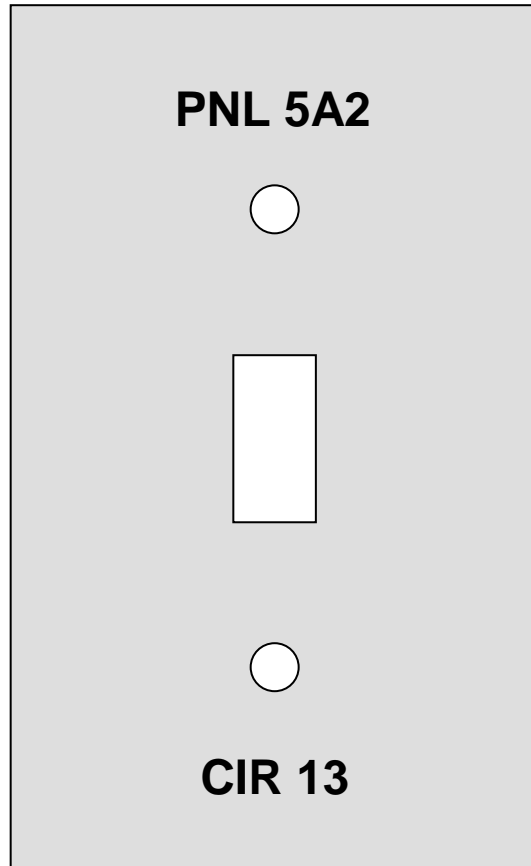
3.4 INSTRUCTIONS TO GOVERNMENT PERSONNEL

- A. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Furnish the services of a competent instructor for not less than four 2-hour periods for instructing personnel in the operation and maintenance of the system, on the dates requested by the Resident Engineer.
- C. Furnish the services of a representative of the Duress, Code Blue/Green and Card Access systems familiar with the functions and operation of the equipment to train staff personnel where devices are provided. Instruction shall include corrective and preventive maintenance of the equipment. **Training shall be accomplished before VA can accept the devices.**

--- E N D ---

ATTACHMENTS FOLLOW

ATTACHMENT A: Electrical Cover Plates – Engraved Labeling Sample ... 1 Page



Electrical Contractor shall verify
Panel & Circuit designations

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 – GENERAL

1.1 DESCRIPTION

This section specifies the furnishings, installation, and connection of the interior lighting.

1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements here in shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- C. Section 26 27 26, WIRING DEVICES: Wiring devices used as part of the lighting systems.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Refer to specification Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Manufacturer & Product Qualifications: Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly engaged in manufacturing items of the type specified. Additional or better features, not specifically prohibited by the specifications, but which are parts of the manufacturer's standard commercial product shall be included in the product.
- C. Source Limitations: Each product type shall be the same and the product of a single manufacturer.

1.4 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS – PRODUCT DATA – SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, furnish the following:

- A. Manufacturer's Literature and Data as applicable.
 - 1. Material and construction details include housing, optics system, lens/diffuser.
 - 2. Physical dimensions and description.
 - 3. Wiring schematic and connection diagram.
 - 4. Installation details.
 - 5. Energy efficiency data.

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6. Photometric data based on laboratory tests complying with IESNA Lighting Measurements testing and calculation guides.
 7. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours) and color temperature (degrees Kelvin).
 8. Ballast data including ballast type, starting method, ambient temperature, ballast factor, sound rating, system watts and total harmonic distortion (THD).
- B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 2. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, lenses, louvers, lamps, and controls.
- C. Operation and Maintenance Manuals: Submit in accordance with Article, INSTRUCTION MANUALS, in Section 01 00 00, GENERAL REQUIREMENTS. Complete operating and maintenance manuals shall be provided including technical data sheets, wiring diagrams, and information for ordering replacement parts. Deliver copies to the Resident Engineer not less than 4 weeks prior to final inspection.
- D. Certifications: Prior to the next Section of electrical work, submit to the Resident Engineer 4 copies of the inspection/testing report tabulating results, analysis, recommendations including records documenting that the material and installation is in accordance with all applicable manufacturers' recommendations, codes and contract requirements. Certifications by an Independent Inspection/Testing Organization – Inspection shall be performed by an electrical system specialist, and testing shall be performed by a qualified technician.
- 1.5 APPLICABLE PUBLICATIONS
- 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.
- A. American National Standards Institute (ANSI):
- C78.1Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics
- C78.2Fluorescent Lamps - Preheat-Start Types - Dimensional and Electrical Characteristics
- C78.3Fluorescent Lamps - Instant Start and Cold-Cathode Types - Dimensional and Electrical Characteristics
- C78.376Chromaticity of Fluorescent Lamps
- B. Certified Ballast Manufacturers Association (CBM):
- Requirements for Ballast Certification
- C. Institute of Electrical and Electronic Engineers (IEEE):
- C62.41Recommended Practice on Surge Voltage in Low Voltage AC Power Circuits
- D. National Electrical Manufacturer's Association (NEMA):
- C82.1Ballasts for Fluorescent Lamps - Specifications
- C82.2Method of Measurement of Fluorescent Lamp Ballasts

- C82.4 Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps
- C82.11 High Frequency Fluorescent Lamp Ballasts
- E. National Fire Protection Association (NFPA):
 - 70 National Electrical Code (NEC)
 - 101 Code for Safety to Life from Fire in Buildings and Structures
- F. Federal Communications Commission (FCC):
 - Code of Federal Regulations (CFR), Title 47, Part 18
- G. Underwriters Laboratories, Inc. (UL):
 - 57 Electric Lighting Fixtures
 - 496 Edison-Base Lampholders
 - 542 Lampholders, Starters, and Starter Holders for Fluorescent Lamps
 - 844 Electrical Lighting Fixtures for Use in Hazardous (Classified) Locations
 - 924 Safety Emergency Lighting and Power Equipment
 - 935 Fluorescent-Lamp Ballasts
 - 1029 High-Intensity-Discharge Lamp Ballasts
 - 1574 Standard for Track Lighting Systems
 - 1598 Luminaires
 - 2108 Standard for Low-Voltage Lighting Systems
 - 8750 Light Emitting Diode (LED) Light Sources for Use in Lighting Products

PART 2 – PRODUCTS

2.1 LIGHTING FIXTURES (LUMINAIRES)

- A. Shall be in accordance with NFPA 70, UL 1598, and shall be as shown on drawings and as specified.
- B. Sheet Metal:
 - 1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight and parallel to each other as designed.
 - 2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 - 3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
 - 4. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.

- C. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.
- D. Lamp Sockets:
 - 1. Fluorescent: Lampholder contacts shall be the biting edge type or phosphorous-bronze with silver flash contact surface type and shall conform to the applicable requirements of UL 542 and ANSI C-81. Contacts for recessed double contact lampholders and for slimline lampholders shall be silver-plated. Lampholders for bi-pin lamps, with the exception of those for "U" type lamps, shall be of the telescoping compression type, or of the single slot entry type requiring a one-quarter turn of the lamp after insertion.
 - 2. Incandescent: Shall have porcelain enclosures and conform to the applicable requirements of UL 496.
 - 3. High Intensity Discharge (H.I.D.): Shall have porcelain enclosures.
- E. Recessed incandescent fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.
- F. Fluorescent fixtures with louvers or light transmitting panels shall have hinges, latches and safety catches to facilitate safe, convenient cleaning and relamping. Vapor tight fixtures shall have pressure clamping devices in lieu of the latches.
- G. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- H. Metal Finishes:
 - 1. The manufacturer shall apply his standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
 - 2. Interior light reflecting finishes shall be white with not less than 85 percent reflectance, except where otherwise shown on the drawing.
 - 3. Exterior finishes shall be as selected by the VA from the manufacturer's catalog.
- I. Provide all lighting fixtures with a specific means for grounding their metallic wireways and housings to an equipment grounding conductor.
- J. Light Transmitting Components for Fluorescent Fixtures:
 - 1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
 - 2. Flat lens panels shall have not less than 3.2 mm (1/8-inch) of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.
 - 3. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.
- K. Lighting Fixtures in Hazardous Areas: Fixtures shall be suitable for installation in flammable atmospheres as defined in NFPA 70 and shall comply with UL 844.
- L. Compact Fluorescent Fixtures: Fixtures shall be manufactured specifically for compact fluorescent lamps with ballasts integral to the fixture. Assemblies designed to retrofit

incandescent fixtures are prohibited except when specifically indicated for renovation of existing fixtures. Fixtures shall be designed for lamps as specified.

- M. Light fixtures shall include a power disconnect device as required by NEC 410-130.G.

2.2 LAMP BALLASTS

- A. Linear Fluorescent Lamp Ballasts: Multi-voltage (120 – 277V) electronic instant-start/ rapid-start type, complying with UL 935 and with ANSI C 82.11 without visible flicker, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated; including the following features:

1. Lamp end-of-life detection and shutdown circuit (T5 lamps only).
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: Class A.
4. Total Harmonic Distortion Rating: 10 percent or less.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Operating Frequency: 20 kHz or higher.
7. Lamp Current Crest Factor: 1.7 or less.
8. Ballast Factor: 0.87 or higher unless otherwise indicated.
9. Power Factor: 0.98 or higher.
10. Interference: Comply with 47 CFT 18, Ch.1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
11. To facilitate multi level lamp switching, lamps within fixture shall be wired with the outermost lamp at both sides of the fixture on the same ballast, the next inward pair on other ballast and so on to the innermost lamp. Within a given room, each switch shall uniformly control the same corresponding lamp in all fixture units that are being controlled.
12. Where three lamp fixtures are indicated, unless switching arrangements dictate otherwise, utilize a common two-lamp ballast to operate the center lamp in pairs of adjacent units that are mounted in a continuous row. The ballast fixture and slave lamp fixture shall be factory wired with leads or plug devices to facilitate this circuiting. Individually mounted fixtures and the odd fixture in a row shall utilize single lamp ballast for operation of the center lamp.
13. Dimming ballasts shall be as per above, except dimmable from 100% to 5% of rated lamp lumens.

- B. Low-Frequency Linear T8 Fluorescent Lamp Ballasts: Allowed for Surgery Suites, Critical Care Units and Animal Labs – 120V/277V hybrid electronic-electromagnetic rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output; including the following features:

1. Automatic lamp starting after lamp replacement.
2. Sound Rating: Class A.
3. Total Harmonic Distortion Rating: 20 percent or less.
4. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
5. Operating Frequency: 60 Hz.
6. Lamp Current Crest Factor: 1.7 or less.

7. Ballast Factor: 0.85 or higher unless otherwise indicated.
 8. Power Factor: 0.90 or higher.
 9. Interference: Comply with 47 CFT 18, Ch.1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
 10. To facilitate multi level lamp switching, lamps within fixture shall be wired with the outermost lamp at both sides of the fixture on the same ballast, the next inward pair on other ballast and so on to the innermost lamp. Within a given room, each switch shall uniformly control the same corresponding lamp in all fixture units that are being controlled.
 11. Where three lamp fixtures are indicated, unless switching arrangements dictate otherwise, utilize a common two-lamp ballast to operate the center lamp in pairs of adjacent units that are mounted in a continuous row. The ballast fixture and slave lamp fixture shall be factory wired with leads or plug devices to facilitate this circuiting. Individually mounted fixtures and the odd fixture in a row shall utilize single lamp ballast for operation of the center lamp.
- C. Compact Fluorescent Lamp Ballasts: Multi-voltage (120 – 277V), electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated; including the following features:
1. Lamp end-of-life detection and shutdown circuit.
 2. Automatic lamp starting after lamp replacement.
 3. Sound Rating: Class A.
 4. Total Harmonic Distortion Rating: 10 percent or less.
 5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 6. Operating Frequency: 20 kHz or higher.
 7. Lamp Current Crest Factor: 1.7 or less.
 8. Ballast Factor: 0.95 or higher unless otherwise indicated.
 9. Power Factor: 0.98 or higher.
 10. Interference: Comply with 47 CFR 18, Ch 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
 11. Dimming ballasts shall be as per above, except dimmable from 100% to 5% of rated lamp lumens.
- D. Ballasts for high intensity discharge fixtures: Multi-tap voltage (120 – 480v) electromagnetic ballast for high intensity discharge lamps. Comply with ANSI C82.4 and UL 1029. Include the following features unless otherwise indicated:
1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 2. Minimum Starting Temperature: Minus 22 deg F (Minus 30 deg C) for single-lamp ballasts.
 3. Rated Ambient Operating Temperature: 104 deg F (40 deg C).
 4. Open-circuit operation that will not reduce average life.
 5. Low-Noise Ballasts: Manufacturers' standard epoxy-encapsulated models designed to minimize audible fixture noise.

- E. Electronic ballast for high intensity discharge metal-halide lamps shall include the following features unless otherwise indicated:
 - 1. Minimum Starting Temperature: Minus 20 deg F (Minus 29 deg C) for single-lamp ballasts.
 - 2. Rated Ambient Operating Temperature: 130 deg F (54 deg C).
 - 3. Lamp end-of-life detection and shutdown circuit.
 - 4. Sound Rating: Class A.
 - 5. Total Harmonic Distortion Rating: 20 percent or less.
 - 6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - 7. Lamp Current Crest Factor: 1.5 or less.
 - 8. Power Factor: 0.90 or higher.
 - 9. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
 - 10. Protection: Class P thermal cut.
- F. Ballasts for lighting fixtures controlled by dimming devices shall be the electronic, high frequency type equipped for dimming and conform to the recommendations of the manufacturer of the associated dimming devices to assure satisfactory operation of the lighting system.

2.3 FLUORESCENT EMERGENCY BALLAST

- A. Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
 - 1. Emergency Connection: Operate fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 - 2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 3. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - 5. Integral Self-Test: Automatically initiates test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing LED.

2.4 LAMPS

- A. Linear and U-shaped T5 and T8 Fluorescent Lamps:
 - 1. Rapid start fluorescent lamps shall comply with ANSI C78.1; and instant-start lamps shall comply with ANSI C78.3.
 - 2. Chromacity of fluorescent lamps shall comply with ANSI C78.376.
 - 3. Lamps shall include the F32T8, F32T8/U 32 watt energy saving type and EPACT approved F40T12 type if specifically required for special applications.

4. Except as indicated below, lamps shall be low-mercury energy saving type, have a color temperature between 3500⁰ and 4100⁰ K, a Color Rendering Index (CRI) of greater than 70, average rated life of 20,000 hours, and be suitable for use with dimming ballasts, unless otherwise indicated. Low mercury lamps shall have passed the EPA Toxicity Characteristic Leachate Procedure (TCLP) for mercury by using the lamp sample preparation procedure described in NEMA LL 1.
 - a. Over the beds in Intensive Care, Coronary Care, Recovery, Life Support, and Observation and Treatment areas; Electromyographic, Autopsy (Necropsy), Surgery, and certain dental rooms (Examination, Oral Hygiene, Oral Surgery, Recovery, Labs, Treatment, and X Ray) use color corrected lamps having a CRI of 85 or above and a correlated color temperature between 5000 and 6000⁰ K.
 - b. In utility areas, service closets, maintenance closets and non-medical storage spaces, utilize energy saving light white lamps.
 - c. Other areas as indicated on the drawings.
 - B. Long Twin-Tube Fluorescent Lamps: T5, CRI 80 (minimum), color temperature between 3500⁰ and 4100⁰ K, 20,000 hours average rated life.
 - C. Compact Fluorescent Lamps: T4, CRI 80 (minimum), color temperature 3500⁰ K, and suitable for use with dimming ballasts, unless otherwise indicated.
 - D. Incandescent lamps shall be the general service inside frosted type rated 130 volts with 3,000 hour extended service except where otherwise shown on the drawings.
 - E. High Intensity Discharge Lamps:
 1. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900⁰ K, and average rated life of 24,000 hours, minimum.
 2. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000⁰ K.
 3. Ceramic, Pulse-Start, Metal-Halide Lamps: CRI 80 (minimum), and color temperature 4000⁰ K.
 4. Low-Pressure Sodium Lamps: ANSI 78.41, CRI 0, and color temperature 1800⁰ K.
 - F. Light Emitting Diode (LED) Lamps:
 1. LED Board: Array of high brightness royal blue LED's
 2. Remote Phosphor Technology: Phosphor lens assembly positioned in front of LED array to convert blue light to white. Color shift not exceed +/-100K over life.
 3. Optical Mixing Chamber: To redirect light through aperture
 4. Thermal Management: Heat sink
 5. Color Temperature: 3500⁰ K
 6. Rated Life: 50,000 hours at 70% lumen maintenance based on IESNA LM-80
- 2.5 RADIO INTERFERENCE FREE FLUORESCENT FIXTURES
- A. Shall be specially designed for suppressing radio frequency energy produced within the fixtures. The Rules and Regulations of FCC (CFR 47, Part 18) shall apply.
 - B. Lenses shall have a light transparent layer of metal permanently bonded to them, and in positive contact with the steel housing or equal to prevent the radio frequency interferences from passing through the lenses. The effective light transmittance of the lenses shall be not less than 75 percent.

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- C. Install line filters within the body of the fixtures and wired in series with the supply circuit conductors to eliminate the transmission of radio frequency energy into the supply circuit.

2.6 SCHEDULE

- A. Fluorescent Fixtures: Refer to drawings for details unless otherwise specified.
 - 1. As manufactured by Lithonia – Premium Grade.
 - 2. Refer to drawings for additional requirements.
- B. Incandescent Fixtures: Refer to drawings for details unless otherwise specified.
 - 1. Prescolite LFIL9HSQ-9RALT-9DOPL-9NTG-PKT261
 - 2. Prescolite LFIL11HSQ-13RALT-13DOPL-13NTG with 24 inch bar hangers
 - 3. Refer to drawings for additional requirements.
- C. Lens Diffusers: Refer to drawings for details unless otherwise specified.
- D. Exit Sign Fixture: Refer to drawings for details. Lightalarms Simplicity Series SLEDWRW with self diagnostic option, canopy kit as needed, and “EXIT” text.
- E. Laser Sign Fixtures: Refer to drawings for details. Lightalarms Simplicity Series SLEDWGW with self diagnostic option, canopy kit as needed, and “LASER IN USE” text.
- F. X-Ray Sign Fixtures: Refer to drawings for details. Lightalarms Simplicity Series SLEDWGW with self diagnostic option, canopy kit as needed, and “X-RAY IN USE” text.
- G. X-Ray Film Illuminators: Not Applicable.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC, manufacturer's instructions and as required by the contract documents. Provide separate neutrals for each lighting circuit. Do not share neutral wires between circuits.
- B. Verify in advance of performing any work the availability, type, capacity, location of electrical power necessary to perform the work.
- C. Provide all necessary components eg, conduit, feeders, transformers, ballasts, cables, hardware, circuit breakers for new and existing systems including panelboards as necessary for all equipment to operate in the manner intended. In the event that the electrical characteristics of any equipment do not agree with the type of available power make the necessary modifications.
- D. All materials, equipment, components, articles, and assemblies installed shall be complete for operation, service and maintenance for the purpose intended not limited to the details and information provided.
- E. Align, mount and level the lighting fixtures uniformly.
- F. Avoid interference with and provide clearance for equipment. Where the indicated locations for lighting fixtures conflict with the locations for equipment re-coordinate the locations for the equipment by the minimum distance necessary as approved by the Resident Engineer.
- G. Lighting Fixture Supports:
 - 1. Shall provide support at each corner of the fixture with a yoke support at each end for all of the fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.

2. Shall maintain the fixture positions after cleaning and re-lamping.
3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
4. Recessed lighting fixtures:
 - a. Recessed lighting fixtures shall be supported to the building structure with two (2) safety chains in trapeze style at all four (4) corners. All fixture mounting devices connecting fixtures to the ceiling system or building structure shall have a capacity for a horizontal force of 100 percent of the fixture weight and a vertical force of 400 percent of the fixture weight.
 - b. Mounting devices shall clamp the fixture to the ceiling system structure (main grid runners or fixture framing cross runners) at four points in such a manner as to resist spreading of these supporting members. Each support point device shall utilize a screw or approved hardware to "lock" the fixture housing to the ceiling system, restraining the fixture from movement in any direction relative to the ceiling. The screw or approved hardware shall pass through the ceiling member, or it may extend over the inside of the flange of the channel or spline that faces away from the fixture, in a manner that prevents any fixture movement.
 - c. Where ceiling cross runners are installed for support of lighting fixtures, they must have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.
 - d. In addition to the above, the following is required for fixtures exceeding 9 kg (20 pounds) in weight. Note: Ceiling types are defined in ASTM Standard C635 69.
 - 1) Where fixtures mounted in "Intermediate" and "Heavy Duty" ceilings weigh between 20 pounds and 56 pounds provide two 12 gauge safety hangers hung slack between diagonal corners of the fixture and the building structure.
 - 2) Where fixtures weigh over 56 pounds they shall be independently supported from the building structure by approved hangers. Two way angular bracing of hangers shall be provided to prevent lateral motion.
5. Surface mounted lighting fixtures:
 - a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts or stud clips shall be minimum 1/4-20 bolt, secured to main ceiling runners and/or secured to cross runners. Non turning studs may be attached to the main ceiling runners and cross runners with special non friction clip devices designed for the purpose, provided they bolt through the runner, or are also secured to the building structure by 12 gauge safety hangers. Studs or bolts securing fixtures weighing in excess of 56 pounds shall be supported directly from the building structure.
 - b. Where ceiling cross runners are installed for support of lighting fixtures they must have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.
 - c. Fixtures less than 15 pounds in weight and occupying less than 2 square feet of ceiling area may be supported directly from the outlet box when all the following conditions are met.
 - 1) Screws attaching the fixture to the outlet box pass through round holes (not key hole slots) in the fixture body.
 - 2) The outlet box is attached to a main ceiling runner with approved hardware.
 - 3) The outlet box is supported vertically from the building structure.

- d. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.
 - 6. Single or double pendent mounted lighting fixtures: Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure.
 - 7. Outlet boxes for support of lighting fixtures shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.
 - H. Furnish and install lamps for all lighting fixtures installed and all existing lighting fixtures reinstalled under this project.
 - I. Coordinate with the electrical and ceiling Trades to assure that the approved lighting fixtures are furnished in the proper sizes and installed with the proper devices, to match the ceiling system being installed.
 - J. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 05 26, GROUNDING & BONDING FOR ELECTRICAL SYSTEMS.
 - K. At completion of project, re-lamp all fixtures which have failed/burned-out lamps. Clean all lenses, diffusers and louvers which have accumulated dust/dirt during construction.
- 3.2 FIELD INSPECTIONS, OPERATING AND PERFORMANCE TESTS**
- A. Inspections (visual/mechanical) and Tests shall be performed during a minimum of two periods (rough and final). Due to project phasing and construction coordination additional periods may be necessary. The electrical system shall be considered ready for the rough Inspections and Tests once the conduit system is complete and all the cables have been pulled. Inspection and Tests requires witness of the VA scheduled 2 weeks in advance, and documentation reports.
 - B. Testing shall be performed with calibrated precision digital meters/instruments. Test instruments, materials, labor shall be supplied by an independent agency utilizing a qualified system specialist furnished by the Contractor.
 - C. Verify compliance of all material, workmanship and installation with approved Submittals, Contract Documents, and applicable Codes. Verify nameplate data with drawings and specifications.
 - D. Inspect all installed and reused equipment, lighting, devices and components for physical integrity, anchorage, alignment, grounding, required clearances & mechanical condition for proper operation within manufacturer's tolerances and applicable requirements.
 - E. Either obtain equipment vendor approval or perform all test procedures recommended by manufacturers and demonstrate that all equipment and components meet the manufacturer's requirements and are installed properly, complete and ready for use for the purpose intended.
 - F. Refer to PART 3 of Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - G. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

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