

Clement J. Zablocki VA Medical Center
Repair and Replace Roofs Buildings 107 and 108
Project #: 695-17-123
Construction Documents

June 6th, 2017



US Department of Veterans Affairs
Clement J. Zablocki VA Medical Center
5000 W. National Ave.
Milwaukee, WI 53295-0001

PROJECT MANUAL
SPECIFICATIONS

Prepared by: Facility Management Division



Milwaukee VAMC

**DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS**

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**SECTION 01 00 00
GENERAL REQUIREMENTS**

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

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

1.2 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for 695-17-123 Repair and Replace Roofs Buildings 107 and 108 as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only as noted in the solicitation.
- C. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the COR.
- E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

1.3 STATEMENT OF BID ITEM(S)

- A. See Bid Schedule in the solicitation document.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. All drawings and specifications (contract documents) may be obtained from the FedBizOps website where the solicitation is posted and they will also be posted on VAMC Milwaukee's file sharing site "Buzzsaw" for contractor use after award. Additional copies will be the responsibility and expense of the contractor(s).

- B. In the case of conflicts or discrepancies within or among the Contract Drawings, the better quality, more stringent requirements or greater quantity of work, as determined by the Government, shall be provided.

1.5 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

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

B. Security Procedures:

1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. Before starting work the General Contractor shall give two week's notice to the Contracting Officer so that 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. Guards: N/A

D. Key Control:

1. The General Contractor shall install hardware for construction doors are per other specification sections to be compatible the MEDECO core.

2. The General Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

E. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
 - a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
 - b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

F. Motor Vehicle Restrictions - reference 010110SN

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) - NA.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(FAR 52.236-10)

- D. Working space and space available for storing materials shall be as determined by the COR.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by COR where required by limited working space.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans

Affairs in quantities sufficient 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.

G. Phasing:

The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks. The work to be outlined shall include, but not be limited to:

To insure such executions, Contractor shall furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing and dates to insure accomplishment of this work in successive phases mutually agreeable to COR and Contractor, as follows:

See drawings for phasing.

H. Buildings No. 107 and 108 will be occupied during performance of work.

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. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated from the

- construction area by temporary partitions and have walking surfaces, lighting etc. to facilitate patient and staff access. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
2. Immediate areas of alterations not mentioned in preceding Subparagraph 1 will be temporarily vacated while alterations are performed.
- I. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:
1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
 2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.
- K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, the Medical Center Director's prior knowledge and written

- approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
2. Contractor shall submit a request to interrupt any such services to COR, in writing, 14 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
 3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.
 5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, no longer in use are to be removed. Nothing is to be abandoned in place. Contractor to seal, cap or plug at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

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

1.7 ALTERATIONS

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

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of buildings.

2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.

3. Shall note any discrepancies between drawings and existing conditions at site.

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

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

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

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

D. Protection: Provide the following protective measures:

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

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

2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

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

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

(FAR 52.236-9)

- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and

"Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. A National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate medical center) office. The apparent low bidder, contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:

- Designating areas for equipment maintenance and repair;
- Providing waste receptacles at convenient locations and provide regular collection of wastes;
- Locating equipment wash down areas on site, and provide appropriate control of wash-waters;
- Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
- Providing adequately maintained sanitary facilities.

1.10 RESTORATION

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

- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.11 PHYSICAL DATA

- A. Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.
- B. Government does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly. Upon proper application to Department of Veterans Affairs, bidders will be permitted to make subsurface explorations of their own at site.

1.12 PROFESSIONAL SURVEYING SERVICES - N/A

1.13 LAYOUT OF WORK - N/A

1.14 AS-BUILT DRAWINGS

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

- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COR review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.15 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.
- B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.
- C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.16 CONTRACT'S FIELD OFFICE - N/A

1.17 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

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

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.
- D. Any damage to the equipment or excessive wear due to prolonged use will be repaired replaced by the contractor at the contractor's expense.

1.18 TEMPORARY USE OF EXISTING ELEVATORS

- A. Use of existing elevators for handling building materials and Contractor's personnel will be permitted subject to following provisions:
 1. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.
 2. Contractor covers and provides maximum protection of following elevator components:
 - a. Entrance jambs, heads soffits and threshold plates.
 - b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
 - c. Finish flooring.

3. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes at the contractors expense.
4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining at the contractors expense.
5. All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts at the contractors expense, if recommended by elevator inspector after elevator is released by Contractor.
6. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by Contracting Officer.

1.19 TEMPORARY USE OF NEW ELEVATORS - N/A

1.20 TEMPORARY TOILETS - N/A

1.21 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, in compliance with code and as satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia and repair restore the infrastructure as required.
- E. Electricity (for Construction and Testing): Furnish all temporary electric services.

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

1.22 NEW TELEPHONE EQUIPMENT

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

1.23 TESTS

- A. As per specification the contractor shall provide a written testing and commissioning plan complete with component level, equipment level, sub-system level and system level breakdowns. The plan will provide a schedule and a written sequence of what will be tested, how and what the expected outcome will be. This document will be submitted for approval prior to commencing work. The contractor shall document the results of the approved plan and submit for approval with the as built documentation.
- B. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer.

Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

- D. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.
- E. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.
- F. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.24 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall

include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.25 GOVERNMENT-FURNISHED PROPERTY - N/A

1.26 RELOCATED ITEMS - N/A

1.27 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT - N/A

1.28 CONSTRUCTION SIGN - SEE 010110-SN

1.29 SAFETY SIGN - N/A

1.30 PHOTOGRAPHIC DOCUMENTATION - N/A

1.31 FINAL ELEVATION DIGITAL IMAGES - N/A

1.32 HISTORIC PRESERVATION

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

1.33 TEMPORARY INTERIOR SIGNAGE.

When the contractor's work blocks doors and/or exists, changes paths, etc., the General Contractor is to provide all temporary signage to reroute personnel and block the doors or exits. Locations to be determined based on the ILSM (shift remaining paragraph numbering accordingly).

1.34 CONSTRUCTION COORDINATION DRAWINGS.

Prepare and provide coordination drawings showing the location of openings through slabs, the pipe sleeves and hanger inserts, as well as the location and elevation of utility lines, including, but not limited to, conveyor systems, pneumatic tubes, ducts, all existing utilities, and conduits and pipes 50 mm (2 inches) and larger in diameter. Drawings required for all areas being remodeled or new and ancillary areas required by such utility runs. Ancillary area drawings to include equal space on each side of main runs from main source to final location. These drawings, including plans, elevations, and sections as appropriate shall clearly show the manner in which the utilities fit into the available space and how they relate to each other and to existing building elements and controls for maintenance operations. Drawings shall be of appropriate scale to satisfy the previously stated purposes, but not smaller than 9 mm (3/8 inch) scale. Drawings must be composite (with distinctive colors for the various trades) including but not limited to HVAC equipment, HVAC ductwork, mechanical piping, plumbing,

fire protection, electrical, medical gases, telecommunications, etc.. The submitted drawings for a given area of the project shall show the work of all trades which will be involved in that particular area. A complete composite drawing set or complete sets of separate reproducible drawings and AutoCAD files shall be received by the Government not less than 20 days prior to the scheduled start of the work in the area illustrated by the drawings, for the purpose of showing the contractor's planned method of installation. The objectives of such drawings are to promote carefully planned work sequence and proper trade coordination, in order to assure the expeditious solutions of problems and the installation of lines and equipment as contemplated by the contract documents while avoiding or minimizing additional costs to the contractor and to the Government. In the event the contractor, in coordinating the various installations and in planning the method of installation, finds a conflict in location or elevation of any of the utilities with themselves, with structural items or with other construction items, the contractor shall bring this conflict to the attention of the contracting officer immediately. In doing so, the contractor shall explain the proposed method of solving the problem or shall request instructions as to how to proceed if adjustments beyond those of usual trades coordination are necessary. Contractor to include initial and two revisions as part of original contract. Utilities installation work will not proceed in any area prior to the submission and completion of the Government review of the coordinated drawings for that area, nor in any area in which conflicts are disclosed by the coordination drawings until the conflicts have been corrected to the satisfaction of the contracting officer. It is the responsibility of the contractor to submit the required drawings in a timely manner consistent with the requirements to complete the work covered by this contract within the prescribed contract time.

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**SECTION 01 01 10 (SN)
SPECIAL NOTES**

7/2016

PART 1: GENERAL

1.1 Not Used.

1.2 FIRE ALARM SYSTEM:

FIRE/SECURITY ALARM SYSTEMS: Contractor shall advise the Graphic Control Center and/or the Police Desk at extension 41010/42222 respectively, prior to any work which might result in the Fire Alarm System or Security System (this includes but is no limited to: Smoke Detectors, Water Flow Switches, Pull Stations, Sprinkler Heads, Motion Detectors, Door Contacts, Security Door Controls, etc.) being activated, in addition to having an approved outage form from the Facility Management Department. Notification to Graphics and/or the Police Desk and having an outage form, does not absolve the contractor from following the proper procedures to prevent the system from activating, i.e. covering the smoke heads with paper bags, closing valves, containing dust, monitoring and controlling security devices, etc.). If any system activates due to the contractor's failure to notify the Graphic Control Center, the Contractor's failure to follow proper procedures, or the Contractor's failure to obtain an outage form, a Modification/Settlement by Determination deduction of \$2,500.00 per alarm/event or notice from the Police that a construction area was left unsecured will be issued to the contractor.

1.3 SCHEDULING OF WORK:

- A. Contractor shall verbally schedule work areas with Resident Engineer not less than fifteen (15) calendar days in advance of commencement of work. Verbal notification shall be backed up and verified in writing.
- B. Contractor shall verbally schedule outages or service interruptions with Resident Engineer not less than fifteen (15) calendar days in advance of intended commencement of work. Notification does not guarantee the date of scheduled outage or service interruption however Resident Engineer will schedule such dates and inform the contractor. Date will be scheduled with medical center personnel when service interruption will minimize affect to hospital patients and operations. Contractor to submit VA System Outage Request form to Resident Engineer not less than fifteen (15) calendar days in advance of intended commencement of outage work. Contractor to attend (2) weekly pre-outage meetings with Engineering and staff to coordinate actual date of outage, duration, time of outage, phasing, and affected services. In addition, contractor to attend the pre-outage meeting one hour prior to outage to coordinate communications, readiness, pre-outage checklist, document requirements, temporary measures, lock out tag out and other outage requirements and procedures.
- C. Contractor to attend weekly construction meetings.

1.4 PROTECTION OF WORK AREAS:

Contractor to provide drop cloths when working in occupied areas to avoid staining or damaging existing carpets or vinyl tile floors.

1.5 HOURS OF WORK:

- A. The hours of contract work shall be from 7:00 a.m. until 4:30 p.m. the normal work shift for hospital employees, the contractor shall verify shift or shifts required for construction areas. Other than normal, after (off) hours, including federal holidays shall be scheduled two days prior to starting with the Project Manager. These off hours will be required to complete the project in the time allotted for the contract at no additional cost to the Department of Veterans Affairs. Upon approval of the Department of Veterans Affairs, the contractor will propose the scope or extent of off hour work due to individual contractor resources available to accomplish this project in the time allotted. In addition, these off hours will be required for utility/service interruptions, and any/other work that may interrupt the operation of the occupied space, i.e., some road construction, demolition, work in occupied areas, work affecting occupied areas, etc. Some noise producing demolition operations will be required to be scheduled for off work hours as directed by Resident Engineer and described on drawings.
- B. Certain work items, which require off-hour work, have been identified. These items are indicated on the drawings. Refer, in particular, to Phasing Notes on Drawings. All drawings shall be reviewed for off-hour work requirements and items creating disturbance to the hospital staff or patient care must be performed during off-hour working periods as established and approved by the VA Engineer.
- C. Building will be occupied during performance of work, but areas of alterations will be vacated. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas, which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by the VA so that Medical Center operations will continue during the construction period. Contractor to construct 7 feet tall by 5 feet wide metal stud and drywall tunnels through occupied space as deemed necessary by the VA for access by Medical Center personnel and maintaining construction operations.

1.6 SUBMITTALS:

- A. Start of Construction: The contractor submittals must be forwarded in sufficient time to permit proper consideration and approval by the government and be timed to permit adequate lead time for procurement of contract required items. Delivery of submittals to the COR or verbal acknowledgement of receipt by the Project Manager **does not** constitute approval or approval to mobilize.
- B. Sole Source Items: There will be no substitutions for the products and services listed below. Sole source items to be in accordance with VAAR 852.236-90 Restriction on submission and use of equal products. This clause applies to the following items:

| <u>System / Equipment</u> | <u>Manufacturer and Model</u> | <u>Part of Project</u> |
|---------------------------------------|---|------------------------|
| Fire Alarm System | Siemens Cerberus Pyrotronics System | No |
| Security System & Code Blue | Johnson Controls Pegasys/P2000 System | No |
| Pneumatic Tube System | Swiss Translogic | No |
| Medical Gas Alarms | Puritan Bennett Medical Gas alarms | No |
| Nurse Call | Jeron Health Care Call System Provider 790 Nurse Call System | No |
| Isolation Room Controls | Employ Critical Room Control | No |
| Doors, Hardware, Locks and Keying | Employ Best Patented cylindrical and mortise sets with Medeco 7-pin interchangeable cylindrical cores, LCN Closers (Mechanical, Electronic Hold-Open, Electromagnetic), Von Duprin Exit Devices, Hager Hinges | No |
| Automatic Door Operator | Tormax 1301 Super HD Automatic Door Operator (Low Energy) | No |
| Building Automation and HVAC Controls | Johnson Controls Metasys control system | No |
| Refrigerator Temperature Controls | Cooper Atkins Temp Trak Refrigeration Temperature Control System | No |
| Wander Guard | Accutech ES2200 Patient Wandering Prevention System | No |
| Modular Furniture | Herman Miller Products | No |
| Patient Ceiling Lifts | Guldmann GH3+ Ceiling | No |

| | | |
|---|---|-----|
| Modular Brick | Belden Brick (County Materials) Seal Brown Velour A, Modular Brick | No |
| Automatic Transfer Switches | Eaton Magnum Transfer Switches | No |
| Electrical Metering | Eaton/Cutler Hammer PowerXpert system | No |
| Interiors | Reference Interior Schedule | No |
| Tile Grout Sealant | Microguard Inorganic Protective Barrier | No |
| Firestop Systems | HILTI Firestop Systems | Yes |
| Curtain Track Rail Support System (CTRSS) | Barrier Free Lift RX-6001/Architex Speed Fabric | No |
| Interior Signage | 2/90 Sign Systems | No |

1.7 EMERGENCY SERVICE:

All offerors, if successful, must be able to respond to all contract and contractor created emergency services resulting from contractor actions and installations, as determined by the Department of Veterans Affairs Resident Engineer, with qualified staff personnel within one (1) hour of verbal notification during construction stages and warranty period. Bidders must be prepared to show proof, in writing, that they can satisfy this requirement prior to award.

1.8 KEYS:

Keys for access to construction/work areas may be issued to the contractor at the discretion of the Project Manager. Up to three sets of keys will be provided at no cost. All keys will be assigned through the SAMS box and the contractor will be given access based on their VA ID Card. Upon completion of the work, failure to return all issued keys to the Project Manager will result in the issuance of a Settlement by Determination in the amount of \$100.00 for each outstanding key. In addition, a \$50.00 fee will be paid to VA for each outstanding key. Keys will be provided through the FM SAM Box. Keys are to be picked up and returned daily. If keys are not returned by the end of the day, a modification of \$50.00/key per day will be assessed against the contractor.

1.9 SAFETY ITEMS:

A. Training:

- All employees of contractor and subcontractor shall be aware of the egress routes from the construction areas. It is the contractor's responsibility to ensure all employees are aware of the fire alarm codes for the building they are working in and participate in fire alarm drills and actual fire alarms.
- Project Site Superintendent shall have the 30-hour OSHA certified Construction Safety course.
- All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course.
- Submit training records of all such employees for approval before the start of any work onsite.

B. Barricades: The contractor is responsible to erect barricades, construction and safety signs, and new egress routes. The barricades will be erected to restrict areas where hazardous operations are performed. The construction and safety signs shall consist of caution signs as determined and approved by VA; egress signs, where egress has been altered for construction; and any applicable hazardous warning signs. If the egress is changed due to construction, the contractor shall provide temporary directional signs for changes as determined by VA and for construction of any walkways, steps, or overhead protection scaffolding or the like as required providing a new means of egress. **Emergency egress plan shall be developed by the contractor and submitted for approval by the designated VA safety manager before egress routes are altered.**

C. Fire Extinguisher: The contractor and subcontractors shall provide fully charged and fully operational fire extinguishers as required and in accordance with section FSS on the job site(s) at all times. Reference section 01 01 10 FSS.

D. Debris: Combustible storage and debris shall be kept to the lowest level necessary for required daily operations. The construction area shall be kept clean as indicated in general requirements and conditions

E. Gasoline Powered Equipment: Gasoline powered equipment shall not be used within the confines of any building on the Medical Center without specific written permission from the Chief, Engineering Service.

F. Fire/Smoke Doors: Fire and/or smoke doors shall not be propped open or prevented from closing and latching. This includes mechanical equipment rooms and utility closet doors.

G. Construction Site Phone: Contractor to run wiring from telephone closet to the construction space for the installation of a VA phone in the constitution space. Installation of the phone is required prior to construction can begin. The VA will provide the phone.

H. Construction Hard Hats: General Contractor to provide (4) sets of hard hats and safety glasses for each worksite for VA staff use.

I. Exit Signs:

- a. Inside Construction Space: Contractor to provide luminescent Exit Signs throughout the construction space such that while standing

in any place within the construction space, an Exit sign is visible and the path of egress can be followed.

- b. Outside Construction Space: Contractor will cover, relocate, etc. Exit signs impacted due to their construction operations as directed by the ILSM and the VA Safety Officer.

1.10 SECURITY OF CONSTRUCTION SITES - Contractor Regulations

- A. All construction sites must be secured to prevent inappropriate access by patients, visitors, and employees. While such security fences, doors, and barricades are temporary, they must be substantially installed to control access to the site. The existing security (Pegasys by Johnson Controls and Ingersoll Rand) system must be extended to each construction access door. Each construction door must be provided with an Ingersoll Rand Integrated Reader Lock programmed to the existing VA security system. Construction sites and all security measures must be monitored daily to ensure that security is maintained. Local VA Police must be alerted about the construction project. At the close of activity daily, before securing the site or portions of the site, the contractor must ensure that there are no patients, visitors, or staff in the area. If construction site problems arise, the Contracting Officer and COR will take appropriate action to correct any and all safety and security conditions.
- B. VA engineering, safety/fire department, and police staff must have the right to access the construction site as needed to perform their assigned responsibilities.
- C. Lock up the worksite at all times to prevent patients and other unauthorized people from entering the site.
- D. The need for job site security is much greater when work is being conducted in psychiatric areas to protect the safety of the patients. All job boxes, tools, etc., must be locked up even when workers are on site unless there's enough activity to assure that patients cannot access tools or site. Verify that no one is in the construction area upon locking up the site for the evening.
- E. Two evacuation routes from the worksite must be maintained at all times.
- F. Contractors may lock up their tools etc., with personal locks.

1.11 PENETRATIONS:

A. WALL:

- a. All wall and/or floor penetrations created by work on this contract, whether by demolition or new construction, shall be patched by the general contractor or as assigned by the general contractor. All patching materials shall be of like kind or a suitable substitute approved by NFPA or UL.
- b. If the permit is for other than inspection, a Follow-Up Inspection page will need to be filled out by the person performing the installation/removal work, which then needs to be signed and returned to whoever originally issued the permit. The permit initiator is then responsible for checking the areas listed on the permit to ensure firestopping was completed according to Facility standards and penetrations sealed with an approved fire/smoke sealant compound so as to maintain fire and smoke separation integrity. Documentation of the sealant or system used in the penetration must be made available at

the affected penetration by the permit requestor at the time of permit completion inspection. The program or person completing the follow up inspection must validate that the sealant compound or system is properly rated and installed for maintaining the rating of the affected smoke or firewall. Photo-documentation in lieu of interim inspections can be performed to validate work.

- c. ONLY (1) one type of fire sealant is permissible per hole.
- d. The permit will be in this person's possession while all inspections and/or work are being performed.

B. CEILINGS:

- a. To ensure that proper ceiling penetrations are sealed, all internal departments and contractors doing any cabling, wiring, plumbing, etc., must obtain a ceiling access permit from Facilities Services prior to installation.
- b. All wall penetrations must be located, marked, and sealed by contractor responsible for penetration. As penetrations are sealed, Facilities Service must be contacted to inspect penetrations for proper sealing.
- c. If the permit is for other than inspection, a Follow-Up Inspection page will need to be filled out by the person performing the installation/removal work, which then needs to be signed and returned to whoever originally issued the permit. The permit initiator is then responsible for checking the areas listed on the permit to ensure firestopping was completed according to Facility standards and penetrations sealed with an approved fire/smoke sealant compound so as to maintain fire and smoke separation integrity. Documentation of the sealant or system used in the penetration must be made available at the affected penetration by the permit requestor at the time of permit completion inspection. The program or person completing the follow up inspection must validate that the sealant compound or system is properly rated and installed for maintaining the rating of the affected smoke or firewall. Photo-documentation in lieu of interim inspections can be performed to validate work.
- d. The permit will be in this person's possession while all inspections and/or work are being performed.
- e. At the end of each work day and prior to leaving work site, the contractor shall replace all ceiling tiles temporarily removed to do work above finished ceilings in corridors.
- f. If it is not practical to replace all ceiling tiles on a daily basis the contractor is to construct 7 feet tall by 5 feet wide metal stud and drywall tunnels through occupied spaces as deemed necessary by the VA for access by Medical Center personnel and maintaining construction operations. Upon the first incident of the contractor not replacing the ceiling tiles, this tunnel construction will have to commence immediately prior to any further construction on the project.

C. Reference section 01 01 10 - 1HR for additional information.

1.12 PHASING AND UNUSUALLY SEVERE WEATHER CONDITIONS:

Phasing on this contract is critical as portions of the area to be remodeled shall remain occupied throughout the construction work. Contractor will be working in an operational hospital and not be provided

designated elevators or entrances. The contractor will share the corridors, the B-Bank elevators, loading dock, etc. with staff, patients and other contractors. Each phase shall be as described on the drawings and/or specifications shall be completed in the sequence described. Also refer to Section 01 00 00, Article 1.6.G. Phasing.

Unusually Severe Weather Conditions: The contractor is expected to understand the seasonal conditions affecting the work and to take into account normal weather variations at the site location during the planned period of performance. Before a determination that the contractor is entitled to additional time extension (excused delay) for unusually severe weather, the contractor must demonstrate (1) that the weather was unforeseeable and unusually severe and (2) that critical path work was actually delayed by the weather. Risk allocation for unusually severe weather conditions is the responsibility of the contractor and is not compensable.

1.13 PROTECTION OF PROPERTY

The contractor is required to preserve and protect all structures, equipment, and vegetation on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under the contract. The contractor will be required to repair any damage to facilities resulting from failure to exercise reasonable care in performing the work.

1.14 SCAFFOLDING:

All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926. Contractor is to provide copies of daily scaffolding inspections with daily logs.

1.15 ENERGY EFFICIENCY REQUIREMENTS:

- A. Federal Executive Order #13423/#13514 requires all energy efficiency materials, equipment, and systems to be evaluated and if feasible incorporated into VA Projects. The A/E, prime contractor, and all subcontractors shall cooperate with the Federal Government in specifying, evaluating, documenting, purchasing, and installing energy efficient equipment that meet basic energy efficiency criteria established by the VA.
- B. All design and installation will be in accordance with current VAMC, HVAC design guides, NEC, NFPA, ASHRAE 90.1, state, local and all VA and federal codes.
- C. The VA intends to provide energy savings equipment and design modifications for current energy usage to the most efficient and economical level possible.

1.16 INSPECTIONS:

All mechanical and electrical work shall be inspected by Engineering Service (Shop & Resident Engineer) personnel prior to being put into operation or closing up if work will be hidden by walls, ceilings, drop ceilings, cover plates, access panels, etc. Contractor shall notify the VA RE a minimum of two days prior to the inspection date, times and dates shall be scheduled and agreed upon by VA. Installations will be inspected by these VA personnel for work in compliance with State, Federal, Local, Dept. of Veterans Affairs Codes, regulations and contract specifications. If corrections, alterations, adjustments, new construction etc. is required, the VA will be notified within 48 hours of completion of such

items. These inspections and corrections, alterations, etc. will be made at no additional time or cost to VA.

1.17 CONTRACTOR'S AGREEMENT - RULES AND REGULATIONS FOR ALL CONTRACTORS

The following is the contractor's agreement required to be signed at the pre-construction meeting and updated monthly when new subcontractors start working on the job site. The agreement is the general contractor's responsibility to ensure all subcontractor personnel are trained and acknowledge (sign) the agreement.

A. STANDARD POLICY:

All outside General contractors and Sub-contractors will coordinate all work within the hospital with Facilities Management before beginning work.

B. PURPOSE:

General Contractor will ensure that each individual General Contractor and Sub-Contractor employee is responsible for complying with established hospital standards, applicable OSHA Safety Requirements, federal, state and local environmental regulations, wearing prescribed safety equipment, and preventing avoidable accidents.

C. PROCEDURE

The contractor will ensure that each individual contractor and sub-contractor employee review, understand and acknowledge (sign) the following information prior to the commencement of work scheduled at this facility. General Contractor will forward copies of signed acknowledgements to Project Engineer of all new employees on a monthly basis.

The following building rules and regulations affect all contractor personnel, suppliers, and vendors:

D. Access to Construction Areas

- Access is limited to areas such as critical care and surgical units, as well as mechanical/electrical rooms, etc. Access can be obtained through Facilities Service.
- Access to any floors of the facility after normally scheduled work hours (Monday-Friday, 7:00 a.m.-5:00 p.m.) must be scheduled in advance with the Project section of Facilities Service. Police and Security reserves the right to refuse access to anyone without prior authorization and identification.
- Ready access for the Engineering, Safety, Police and (the Fire Department) shall be maintained to all areas under construction at all times.
- Areas under construction shall be locked during off-hours. Keys and cylinders for this purpose are obtained through Facilities Service. Contractors will not put their locks on any doors without VA approval.

E. Accidents and Injuries

- First Aid/Medical Aid/Emergency Treatment for workers: The contractor must post emergency phone numbers and treatment

facilities if any contractor employees are injured on the job, or need medical treatment

- Work site injuries must be reported to the VA. The VA has an accident reporting form (form number 2162). The COTS/ Safety/ or Security and Police Service will initiate the 2162. Once the VA has completed the supervisor's portion the injured individual will be required to complete the narrative portion of the report. The service chief responsible for the contract is also required to sign the report and forward the original report to the Safety Section.

F. Asbestos

- There are both friable and non-friable asbestos-containing materials located within the hospital complex. Inspection reports are located in the Facilities Service Department. Contractors are required to be aware of the asbestos materials located in the vicinity of their work. Further, all contractors are expressly forbidden to disturb any asbestos-containing materials unless specifically authorized in writing by VA. Under no circumstances are any materials supplied or installed by the contractor to contain asbestos in any form or quantity.
- Asbestos removal contractors will be trained and licensed, and will follow all OSHA rules, VA specifications, state and local regulations from notification to disposal.
- A VA representative will verify the adequacy of the barriers and ventilation before any asbestos removal work is conducted.
- The contractor is responsible for monitoring his own employees' exposure to asbestos.
- Additional specific asbestos removal specifications will apply.
- Contractor to provide a Fiscal Year breakdown of Asbestos Costs on the project.

G. ACM TRACE WORK OPERATIONS:

- **ACM TRACE RESULTS** - Should renovation activities deem the material friable due to cutting, grinding or other mechanical means of removal, an employer is bound by OSHA 29 CFR regulations 1926.1200 (d) (5) (iv) to protect their employees. This may determine that removal of the materials be performed by asbestos abatement workers trained in 29 CFR 1926.1101.

**OSHA regulation 1910.1200 HAZARDOUS COMMUNICATION Section (d) (5) Hazard determination "...employer shall determine the hazards of mixture of chemicals as follows: (iv) "If the...employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent...could be released in concentrations which would exceed an established OSHA permissible exposure limit...or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard."*

- **General Summary:**
 1. Employees, contractors, etc. must be warned about the presence of asbestos.
 2. The contractor must have a competent person on site during work. (At a minimum, it should be a trained, certified asbestos supervisor).
 3. Personal exposure assessments (negative exposure assessment) are required (PCM analysis) and workers should begin work with PPE.
 4. Wet methods and daily clean up and sealing waste in leak tight containers are required. The following is a list of references from OSHA guides. Note: The reference to the word "sheet rock" is based on trace (<1%) of asbestos being present in the "sheet rock."
- The contractor will be responsible for proper work practices and prohibitions for all construction activities involving material that contains any amount of asbestos regardless of the exposure levels. And the standard has exposure-based requirements, consisting of a 0.1 fiber/cc 8-hour TWA PEL and a 1 fiber/cc 30-minute excursion limit, and other requirements that apply whenever worker exposures exceed either or both of the limits, regardless of the amount of asbestos contained in the materials involved.
- If some of the items associated with the installed sheetrock contain some asbestos but none of them contain >1% asbestos, then removal of the sheetrock is considered unclassified asbestos work. This means that only certain ones of the standard's work practice and engineering control obligations, and prohibitions pertain. Some of the general ones do not pertain because they apply to installed building materials containing >1% asbestos (ACM). How many of the eligible general work practice and engineering control obligations, and prohibitions are applicable depends on whether the employee levels of exposure to airborne asbestos exceed either of the asbestos PELs. In further explanation: These OSHA references are specific to this issue.
- If the employees' asbestos exposures exceed neither asbestos PEL, then only two of standard's general work practice control procedures and three of the standard's general prohibitions pertain to the sheetrock removal operation; none of the standard's engineering control methods pertain to the sheetrock removal operation. Those general work practice procedures and general prohibitions the employer must observe under such a condition are those presented at:
- 29 CFR 1926.1101(g) (1) (ii), which requires: **wet methods, or wetting agents, to control employee exposures during asbestos handling, ... removal, cutting, ... and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to for example, the creation of electrical hazards ... and equipment malfunction...**; 29 CFR 1926.1101(g) (1) (iii), which requires: **prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers...**; 29 CFR 1926.1101(g) (3) (i), which prohibits: **high-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered**

exhaust air; 29 CFR 1926.1101(g) (3) (ii), which prohibits: compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air; and 29 CFR 1926.1101(g) (3) (iv), which prohibits: employee rotation as a means of reducing employee exposure to asbestos.

H. Clean-Up

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

I. Compressed Gas Cylinders:

- Compressed gas cylinders are very dangerous if not treated properly.
- Employees who work with compressed gas cylinders must have specific training.
- Make sure that they are secured properly when in use or in storage.
- Always keep the caps on the cylinders when they are not in use.
- See also Hot Work section.

J. Confined Space:

- Confined Space Entries. All Confined Spaces are clearly marked on campus. NO ENTRY is allowed in the areas without prior approval by the Project Engineer. NO ONE will be allowed to enter these areas without the proper qualifications, equipment and training as required by the OSHA Standards (29 CFR 1910.147)
- Identify storm sewers, underground electrical vaults, and all other areas that require confined space permits. (e.g., a map showing the locations of all the confined spaces located in the Facilities Service Department).
- All hospital personnel that would require entry into these spaces must abide by the Confined Space Program Procedure.

- It is the sole responsibility of any outside contractor doing work on a VA Medical Center campus to coordinate entry into any of these spaces or any other marked permit required confined spaces with the medical center.
- Anyone entering a permit-required confined space must follow Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR 1910.120.
- **Contractor to submit as a formal submittal the Confined Space Entry program (and CSE Permit if needed).**

K. Contractor Room/Space Guidelines:

- Materials will be kept on the job site, in the contractor's room or in storage space provided by the Contractor via trailer located in the VA corporation yard on the North East section of the VA grounds.
- Any shared space within storage room(s) must be accessible to Facilities Service. Do not block access to electric panels or fire protection equipment.
- Hallways are not to be used for storage.
- Contractors will manage the area and assure the site is kept clean and safe. (OSHA standards apply.)
- Any disputes or concerns will be directed to the Facilities Service Manager.

L. Damage by Contractors:

- Any damage caused by the contractor's employees is to be reported to the COR or Facilities Service Project Section immediately.

M. Deliveries:

- All material deliveries at the loading dock must be coordinated with the Receiving Department in advance.

N. Dress Code:

- All personnel must be appropriately dressed for their work. T-shirts or garments with obscene or suggestive messages are not permitted. Personnel found improperly dressed will be asked to leave the facility. No construction staff is allowed to remove shirts or other clothing. No articles may include offensive statements/graphics.

O. Dust Barriers and Ventilation Requirements:

- Reference section 01 01 10 IC.
- Dust barriers are needed to protect occupied areas on any portion of the job that has potential to create dust.

P. Elevator Usage:

- Contractors shall not hold or block from use any public elevators in any building unless authorized by the COR.

- Contractors shall use "B" bank freight elevators only for the delivery and transportation of materials and demolition materials. Contractors shall not hold or block public elevators from use in any building. .

Q. Emergencies:

Fire Plan - There is no difference between a fire drill and an actual fire.

General Contractor will ensure that each employee on the worksite knows where the pull stations are in the areas you are working.

If you are in the area of the fire:

- R Rescue anyone from the area if necessary**
- A Pull the nearest Pull Station**
- C. Contain the fire by closing all doors in the area**
- E Extinguish if possible or Evacuate the area immediately**

If you are NOT in the area of the fire:

Construction Workers are to cease activities, stay in place, and wait for further instructions or cancellation of the fire drill.

DO NOT move through the hospital. DO NOT use the elevators or stairwells.

- Medical Emergencies - Any contractor who witnesses a medical emergency is to pick up a nearest phone and dial "911" or the operator and describe the condition of the emergency.
- Accidents/Injuries - The contractor must post emergency phone numbers and treatment facilities for any injured employee.
- Worksite injuries must be reported to the VA immediately using the VA accident reporting form (Number 2162). The COR/Safety/or Security and Police Service will initiate the 2162.
- Patients and visitors may be anxious or irritated because of their situation. If you are faced with any patient or visitor that gets aggressive with you, simply call Ext. 42222 and say "Code Green" and describe the situation. Security will respond immediately.

R. Equipment Safety:

- Ladders are not to be left unattended in public areas during breaks and lunch hours. Ladders shall be laid down and placed out of traffic areas during these periods.
- No tools, carts, ladders or other equipment are to be left unattended outside a secure area.
- Yellow safety barricades must be used when working in public areas.
- Use of hospital equipment is permitted only if the contractor receives permission from Facilities Service and is properly trained on the USC of the equipment.

S. Equipment and Supplies:

- Caution must be used with all flammable materials, i.e., adhesives, thinners, varnishes, etc.
- All paints shall be low odor latex paint. The contractor will use odor reducing agents in all paints and solvents. Ventilation will be required if toxic or foul-smelling materials have to be applied.
- Only a one-day supply of paints, oils, and gas cylinders is permitted within the facility, unless it's properly stored in a flammable liquid storage cabinet.

T. Fire Alarm System:

- Care must be exercised to prevent the accidental tripping of smoke detectors or fire alarms.
- Notify Facilities Service of your activities and location.
- Cover and protect the smoke alarms with paper bags when raising dust or creating smoke in short duration (less than 3 days) ancillary work areas. All other construction areas to follow section 01 01 10 - 1HR. (You must inform Facilities Service Fire Department when bagging smoke alarms.)
- Remove the paper bag upon completion of your work and at the end of each workday.
- If you accidentally trip an alarm, notify Facilities Service (Fire Department) immediately.

U. Hazardous Materials and Waste:

- A listing of all hazardous materials that will be used on the job and their material safety data sheets (MSDS) will be provided to the VA before the chemicals are used.
- Any excess or used chemicals will be removed from the hospital promptly and properly disposed of by the contractor in accordance with federal, state and local regulations.
- Any hazardous waste generated at the facility must be properly contained and labeled and stored in accordance with local, state, federal and hospital regulations.
- Do not store flammable materials in the facility unless stored in an approved non-combustible storage cabinet or prior approval by the Project Engineer and Safety Office.

V. Heavy Lifting:

- Hoisting heavy materials/items require prior review by the Project Engineer.

W. Housekeeping:

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

- Debris and waste will not be allowed to accumulate on the work site and disposal must be arranged to keep the amounts low.

X. Hot Work Permits:

- Hot work permits are required before cutting, soldering, welding operations begin. Before any cutting, soldering or welding is conducted, the contractor or sub-contractor shall obtain permission through a hot work permit. The contractor shall be responsible for obtaining the hot work permits from the Project Engineer.
- Gas and oxygen canisters shall be properly chained and protected and two 10-pound fire extinguishers shall be present.
- A fire watch shall be maintained on the worksite during the hot work operations, and for 30 minutes after the hot work is completed.
- **All burn permits will be completed, signed and scanned within 48 hrs and posted to Buzzsaw.**

Y. Identification Badges:

- ID Badges are required for all contractor employees working at the V.A.
- Before beginning work on any project, all outside contractors shall obtain a VA contractor badge from the Police / Security Desk and obtain a contractor's I.D. badge. The Contractor will complete the badge application and email it to the COR, who will forward to the Police. The contractor will stop at the Police Desk 1-2 days later to complete the badge process. The outside contractor will supply the following information: location of work site, authorization, duration, and any pertinent information that is required.
- All contractors working at the Milwaukee VA will be finger printed and the finger prints processed prior to obtaining a VA badge. There is an approximate 5 day wait once finger prints are given to when processed and the contractor can return to obtain the photo ID badge. Badges will be active for only 90 days at a time.
- General Contractor will be required to request, thru the COR, for reactivation/continued activation of all contractor badges every 90 days.

Z. Infection Control:

- Reference section 01 01 10 IC.
- Sensitive/High Risk areas of the hospital require extra precautions to assure patient safety. These areas include but are not limited to the operating rooms, intensive care units, chemotherapy and transplant units. Contact infection control for other areas that may require special precautions.
- When working in patient care areas, please be sure to read and follow the directions listed on any Infection Control Precaution sheets posted outside of a patient's room. Generally this means permission must be obtained from Nursing staff before entry.
- Temporary walls or dust barriers are required to enclose areas under construction.

- Under some circumstances it may be necessary to block return and supply ducts, and install special HEPA exhaust ventilation from the worksite. There should be no re-circulation of air from construction area to rest of hospital.
- Dampened walk-off mats must be located outside of construction area.
- Dust mops/wet mops must be available to remove any dust tracked outside barriers.
- *Standard Precautions* assumes that any person may carry a contagious disease. In order to protect you from these diseases always assume blood, non-intact skin, mucous membranes and all other body fluids and excretions are infectious. Do not touch any such materials but contact a VA employee immediately. Needle container boxes are provided for the disposal of syringes and other sharps used in the medical center. These must be properly disposed of and should be moved only by VA personnel. The VA Medical Center provides written guidelines, education, and personal protective equipment (PPE) for anyone working at VA Medical Center campus to prevent their exposure to bloodborne pathogens.

AA. Interim Life Safety:

- The hospital will document whether and to what extent Interim Life Safety Measures will be implemented for each project.
- VA Safety will ensure what interim life safety measures (ILSM) are required by the General Contractor to temporarily compensate for the hazards posted by existing Life Safety Code (LSC) deficiencies or construction activities in areas of the Medical Center.
- Implementation of ILSM will be required in or adjacent to all construction areas and throughout buildings with existing LSC deficiencies, ILSM applies to both construction workers and affected hospital employees, and will be implemented upon construction development and continuously enforced through construction completion.
- Almost always, Interim Life Safety Measures will require walkthrough inspections by the job foreman, the project manager, and safety staff at varying intervals.
- Training of workers and any affected staff will always be a significant part of the
- Interim Life Safety Measures procedures.

BB. Life Safety:

- Any life safety code violations incurred during construction or renovation must be resolved and will result in close coordination with Project Engineer and Safety Section to implement the hospital's Interim Life Safety Measures. These measures are required by JCAHO and NFPA.

CC. Lock Out/Tag Out:

- Lock Out/Tag Out - No contract worker is allowed to change the status/position of ANY switch, valve or any other energy source without prior approval from the Project Engineer. All Lock out/Tag

Out activities need approval prior to being implemented. Any activity requiring a Lockout/Tagout process must comply with the hospital policy.

- Per OSHA Regulation 29 CFR 1910.147, all contractors must comply with OSHA's Safety Lockout/Tagout procedures.
- Coordinate all shut downs with Hospital Personnel.
- Only VA staff is authorized to shut down utilities unless permission is specifically granted.
- **Contractor to submit as a formal submittal the Lock Out / Tag Out Program policies and procedures.**

DD. Safety Data Sheets (SDS):

- Formerly called Material Safety Data Sheets (MSDS)
- SDS must be provided for any hazardous materials that you will be shipping or delivering to the VA Medical Center.
- SDS are available for all materials used in the medical center. Contact the COR if you need an SDS for a VA owned material.
- See also Hazardous Materials and Wastes.

EE. Noise:

- All core drilling, chipping, and hole drilling shall be done at a time and day determined by occupants on that floor and the floors above and below. The COR shall coordinate and approve it.
- The patients, visitors, and staff deserve consideration and the quiet enjoyment of their premises. Anyone found being loud, rude, or otherwise annoying to the patients, their guests, or staff will be asked to leave the facility. Use of vulgar language will not be tolerated.
- All work activity within occupied portions of the facility shall be accomplished with minimal disruption to the patients, physicians, visitors, and staff.
- The playing of radios, tapes, and CD players is not permitted in any occupied area. "Walk-man" radios/tapes/CD players are not permitted anywhere.
- The playing of radios, tapes, and CD players is permitted in vacant areas but shall not be heard outside the vacant area.
- In inpatient areas, coordinate construction activities and debris removal with the Nurse Manager or Charge Nurse to minimize disruption.

FF. OSHA Compliance:

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

which the contractor will be solely responsible, Any contractor found deviating from regulatory standards and/or policy and SOPS will immediately be issued a stop work order and will be responsible for contractual conflicts related to the work stoppage.

GG. Parking:

- Facilities Service Project Section will designate parking. Contractors may not block fire lanes or other roadways. Violators will be ticketed. During large construction projects, a staging site may be available for parking to contractors.
- All Contractors who need parking must contact Facilities Service for a parking permit.
- If special parking is required, permission shall be granted and coordinated through Facilities Management. Contractors should park in the designated Visitor parking areas. Limited loading and unloading will be permitted at the loading dock area, afterwards contractor employees will be required to park in designated areas.

II. Patient/Visitor Privacy:

- Patient/Visitor Privacy. No construction staff is allowed to review, acknowledge or move any patient information or records.
- No construction staff may acknowledge any patient or visitor unless spoken to - even if the individual is known on a personal basis.
- Radios are NOT allowed on campus.
- Cell phones are to be used only in designated areas.

JJ. Personal Protective Equipment:

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

KK. Restroom Usage:

- Contractors are to use public restroom unless otherwise instructed to specific restrooms or portable facilities.

LL. Requests for Information:

- All contractor requests for assistance and information shall be addressed to the Facilities Service Project Section or Facilities Service Department.

MM. Safety Regulations:

- Contractors are expected to comply with all Occupational Safety and Health Administration (OSHA) regulations, 29 CFR 1926 and 1910.
- Work that is performed within a corridor or occupied space must be confined by dust barriers or non-combustible partitions.
- Appropriate job signs and barricades are to be placed in the area of construction to prevent occupants from straying into the job site.
- Stairwell doors shall not be propped open or blocked at any time. Equipment cannot be stored in the stairwells.

- All contractors are encouraged to frequently review these guidelines with their employees and/or subcontractors on site (e.g., during weekly Tool Box Safety Meetings).
- All contractors and their subcontractors are responsible for complying with these guidelines and all other conditions, OSHA requirements, and safety regulations.

NN. Scaffolding:

- All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926. Contractor is to provide copies of daily scaffolding inspections with daily logs.

OO. Smoking:

- The Smoking policy of the hospital is no smoking in any building nor within 50 feet of any the building entrance and only in areas designated for smoking. All construction employees must comply with this policy. A copy of the hospital smoking policy will be supplied at the pre-construction conference.
- Violation of the smoking policy will result in the worker being removed from the worksite for the duration of the project.
- The designated smoking areas are: Smoking Shelter located outside the East entrance
- Job site supervisors will enforce this smoking policy.

PP. Stop Work:

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

QQ. Subcontractors:

- The general contractor has the responsibility to assure that all the subcontractors and their workers are properly trained and follow these safety guidelines. Assistance from VA staff will be providing on a case by case basis on technical issues.
- The VA reserves the right to approve of any subcontractor being used to complete a project.
- A worker on-site must be designated "in charge" at all times during the project.

RR. Traffic Control:

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

SS. Trenching:

- OSHA regulations must be followed during trenching operations.

TT. Waste Management:

- Reference section 01 74 19.

- Trash, combustible waste, and excess construction materials must be removed daily to prevent accumulation. Contractors must arrange for the removal of their debris and waste. The building's dumpster shall not be used unless appropriate arrangements are made with Facilities Service.
- The contractor is encouraged to contact utilize our recycling program for the disposal of recyclables.
- The contractor is expected to comply with all environmental regulations.
- Contractor to provide a Fiscal Year breakdown of Waste Management/Recycling Costs on the project.

UU. Work Site Requirements:

- Contractor to provide a list of emergency contacts at the entrance to construction site.
- All contractors are to maintain their work area as clean as possible while working and cleanup thoroughly every day.
- Prior to any utilities or critical systems being interrupted, a two weeks written notification to Facilities Management Project Engineer is mandatory. Only Facilities Management personnel will shut off a utility.
- All contractors are expected to use courtesy. Loud, vulgar, abusive language, sexual harassment and aggressive behavior will not be tolerated.
- All contractors working above the ceiling are required to replace all disturbed ceiling tile by the end of each day.
- Prior to making any penetrations in walls, floors or ceilings, it is the contractor's responsibility to identify rated systems and be verified through review of as built, line diagrams, etc.
- All repaired penetrations on rated systems must be completed using a fire rated material matching the rating of the system and must be inspected by the Project Engineer before ceiling tiles are replaced or area is concealed.
- Temporary construction partitions of non-combustible materials shall be installed as required to provide a smoke tight separation between the areas undergoing renovation and/or construction and adjoining areas that are occupied by the facility.
- Exits for occupied areas of the building including rooms, suites, corridors and floors shall not be blocked by the construction or by construction materials. Exit may be blocked temporarily if it is unavoidable and adequate alternative measures are provided, such as signage, instructions to occupants and approved in advance by the Project Engineer.

- Existing fire protection systems including fire alarm systems, smoke detection systems, and sprinkler systems shall not be altered except as required for the alteration and/or renovation project. Any alteration to the system shall be coordinated with Project Engineer. When sprinkler or fire and smoke detector systems are out of service for more than eight hours general contractor shall be responsible to institute a Fire Watch till systems are operational.
- At the end of each workday, combustible packaging and crating materials for building products and equipment to be installed shall be removed from the occupied building.
- It is the responsibility of each contractor to know exactly where the fire extinguishers and pull stations are in the areas they are working.
- Fire hazard inspections shall be conducted daily by the contractor once construction starts and until the work is turned back over to the facility.
- All temporary electrical wiring and equipment used for construction shall be installed and used in accordance with pertinent provisions of NFPA 70 and National Electrical Code.
- Contractor shall maintain construction site to permit access by the fire department as necessary. Clear building construction areas of obstructions so that all portions are accessible for fire department apparatus and permit emergency egress of patients and other personnel.
- All necessary precautions shall be taken by the contractor to prevent accidental operation of any existing smoke detectors by minimizing the amount of dust generated in the vicinity of any smoke detectors. Any activity that may generate dust or smoke shall be reviewed with the Project Engineer and the infectious control nurse.

VV. Apprentices Working on Project:

Apprentices are authorized to work on all projects disciplines providing the following requirements are met:

- Completion of OSHA-10 training and certification turned in as required for all other workers
- Apprenticeship documentation turned in to contracting and continued direct supervision by a journeyman.
- Apprentices are not allowed to work at the Clement J Zablocki VA Medical Center on their own nor without continuous direct supervision.

1.18. IDENTIFICATION AND LABELING

A. Identify devices located above ceiling.

- a. Provide markers on all removable ceiling and ceiling access panels to indicate locations of valves, dampers, smoke detectors, etc and other mechanical items that may need servicing or adjustment.

- b. Use access panel markers (metal tack style) for acoustical tile ceilings, or engraved plastic style, 3/4in square, for mounting on panel door or equipment nameplates.
- c. Color code and annotate markers as follows:

| <u>Color</u> | <u>Notation</u> |
|--------------------|--|
| Red | D - Fire Damper V - Valve (sprinkler shutoff) S - Smoke Detector H- Heat Detector |
| Yellow | V- Valve (steam, radiation, reheat and chilled water) |
| Gold | V- Valve (HVAC) D- Damper (HVAC) |
| Blue (valves only) | O- Oxygen V- Vacuum A - Medical Air N - Nitrogen NO - Nitrous Oxide EV - Anesthesia Evacuation T - Temperature control air |

- d. Where fire protection devices are located inside ductwork, provide an additional tag on the duct access door identifying device inside with letter size equal to or greater than 1-1/2 inches high.

1.19. STANDARD REQUIRED FORMS

- A. The following forms are required as noted below:
 - a. Contractor's Checklist - Completed and signed by General Contractor *prior to start of construction.*
 - b. Contractor's Impact Statement - Completed and signed by every contractor / subcontractor working on the project *prior to start of construction.*
 - c. Daily Log of Construction - Completed daily by General Contractor and scanned in and *posted to Buzzsaw weekly by Wednesday of the following week.*

- d. Daily Intermediate Life Safety Measures (ILSM) Inspection Form -
Completed daily by General Contractor and scanned in and *posted to Buzzsaw weekly by Wednesday of the following week.*

CONTRACTOR CHECKLIST

This agreement is between _____ and _____
Project Name (ref. #) _____
Project Start Date _____ Ending Date _____
Work Allowed Between Hours _____ AM/PM and _____ AM/PM

Before performing any work on facility premises, outside contractors must read this checklist and comply with all local, state, federal and facility safety policies.

1.0 Life Safety Will the contractor compromise any part during the Life Safety System of this facility (ceiling tiles, penetrations in smoke or fire walls, blocking exits, shutting down fire/smoke detection or fire suppression, etc.) **Y N**
Describe. _____

1.1 Is Interim Life Safe necessary? **Y N**, if yes, attach and follow interim plan.

2.0 Services Will there be any compromises to patient services during the work performed? **Y N**

2.1 What adjustments need to be implemented to minimize impact to residents, visitors and staff? **Y N** _____

3.0 Chemical Will hazardous chemicals (liquids or gases) be used on-site? **Y N**
If yes, what risks do they create for facility staff? Is there any chance of exposure? _____

3.1 Are there any facility chemicals being used, stored or handled where the contractor will be working? **Y N**
If yes, has the contractor been informed by issuing MSDS's? **Y N**

4.0 "Hot Work": Will the contractor use equipment which will generate open flames, sparks or other ignition sources **Y N**

4.1 Will flammable chemicals be in the area? **Y N**

4.2 Will a **Fire Watch** be necessary to be posted during all Hot Work activities? **Y N**

5.0 Confined Spaces: Does the work involve entry into a confined space? **Y N**
If yes, retain a copy of contractor's Confined Space Entry program (and CSE Permit if needed).

6.0 Lockout/Tagout : Does the work involve maintenance on energized equipment or systems? **Y N (If yes, retain a copy of the contractor's LOCKOUT/TAGOUT program)**

6.1 Is there any impact to residents, visitors, or staff during this procedure? **Y N**

If so, describe the impact, ways to minimize the impact and who has been notified. _____

7.0 Unsafe Conditions/ Impact to Residents, Visitors and Staff Are there any unusual or unsafe conditions which need to be addressed and/or communicated to facility staff, visitors or residents? ? **Y N**
Describe. _____

8.0 Description of Work Area The departments/areas you will be working are
List: _____

8.1 The potential hazards to you/your workers in the areas you are working in
List _____

8.2 The specific problems that can be caused by the wrong actions in the areas you are working
List _____

9.0 Contractor's Employees
Safety Officer Contact _____
Facility Project Manager _____
First Aid Plan _____

Fire Plan _____

Disaster Plan _____
Restricted Areas _____

10.0 Restricted Areas
The following are the areas of the hospital where construction workers are allowed to go in the hospital.
List _____

(Contractor Representative)
Date: _____

(Facility Project Manager)
Date: _____

Contractor's Impact

| System | Possible Interruption | Possible Effect to Patients |
|---|---|--|
| Electrical | <ul style="list-style-type: none"> - Changing position of switches and breakers - Cutting or splicing into wires - Disconnecting wires or terminals - Disturbing Junction Boxes/Electrical Panels - Core Drilling - Demolition of walls - Excavation | <p>Electrical Systems provides LIFE SUPPORT (Directly and Indirectly)</p> <ul style="list-style-type: none"> - Can cause DEATH to critical patients |
| Water Lines | <ul style="list-style-type: none"> - Turning valves - Cutting into lines - Demolition & Excavation | <p>Dialysis, OR, HVAC, ICU, X Ray, etc Can cause DEATH to critical patients Infection Control issues Major Cleanup issues</p> |
| Medical Gases: Oxygen Air Vacuum Nitrous Oxide Nitrogen | <ul style="list-style-type: none"> - Cutting or disturbing into lines (labeled, unlabeled) - Changing valve positions - Deactivating alarms - Demolition & Excavation | <p>Oxygen, vacuum, air, etc. ICU, OR, Med/Surg. Can cause DEATH to critical patients</p> |
| HVAC | <ul style="list-style-type: none"> - Shutting down - Modifying - Changing controls - Cutting into the roof - Producing foul odors near intakes - Cutting into chilled water lines - Obstruct fresh air intake | <p>Temperature is critical in OR, ICU, etc. Infection Control issues Major Air Quality Issues</p> |
| Fire Alarm and Sprinklers | <ul style="list-style-type: none"> - ANY modifications - covering or removing smoke heads - Demolition & Excavation utilities - Damage or set off sprinkler heads - Duct work modifications | <ul style="list-style-type: none"> - Compromising Fire Safety - False Alarms - Floods - Major disruptions and distractions <p>ALL THE ABOVE CAN RESULT IN DEATH</p> |
| Code Alarms Nurse Call Wander Guards | <ul style="list-style-type: none"> - Demolition & Excavation - Unplugging - Changing position of switches/breakers | <p>Lack of communicating system can result in patient death or injury</p> |

IF THERE IS ANY QUESTION REGARDING ANY OF THE INFORMATION ON THIS DOCUMENT, IMMEDIATELY CONTACT FACILITY MANAGEMENT OR SAFETY OFFICE TO RESOLVE ISSUES PRIOR TO WORK COMMENCEMENT.

Contract Company: _____

Receipt Acknowledged: _____

Signature: _____

Date: _____

DAILY LOG OF CONSTRUCTION

M T W Th F Pkg. No.:

| | | | | | |
|--|--|---------------------|---|--|---------------------|
| DAILY LOG OF CONSTRUCTION | | | | M T W Th F Pkg. No.: | |
| | | | | PROJECT: | |
| BUILDING | | | CONTRACT NO. V69DC- | | DATE |
| CONTRACTOR | | | CONTRACTOR REPRESENTATIVE ON JOB | | |
| WEATHER <i>(Rain, Snow, Cloudy, Windy, etc., OR NA if all indoors)</i> | | TEMP. High Low | | SITE CONDITIONS <i>(CLEAN, DEBRIS, DUST, ETC.)</i> | |
| NO. CONTRACTOR'S MEN BY JOB CATEGORIES | | | NO. SUBCONTRACTOR'S MEN BY JOB CATEGORIES | | |
| EQUIPMENT ON JOB Brief description of size | | No. Units | Working Yes No | | MATERIALS DELIVERED |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| STATUS OF WORK | | | | | |
| ITEM NO. | Brief description of work in progress, questionable performance, unforeseen developments on job etc. Include tests made and samples taken. | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| STATUS OF INFECTIOUS CONTROL MEASURES (NEGATIVE AIR FLOW, CLEAN WALK OFF MAT, ANTE-ROOM SECURE,...) | | | | | |
| NEGATIVE AIR FLOW PRESSURE READING: _____ | | | | | |
| SAFETY COMMENTS | | | | | |
| DIFFICULTIES WITH CONTRACTOR OR REPRESENTATIVE | | | | | |
| UNFORESEEN DEVELOPMENTS ON JOB CONTINUED <i>(Describe conditions, action taken; person contacted, recommended actions)</i> | | | | | |
| SIGNATURE | | | TITLE PROJECT SUPERINTENDENT | | |

Daily Intermediate Life Safety Measures (ILSM) Inspection Form

INSTRUCTIONS: This form is to be utilized when significant hazards posed by existing NFPA 101 deficiencies or construction activities are in progress. ILSM must be implemented upon project start and continuously enforced through project completion to provide a level of life safety comparable to that described in Chapter 1-7, 31 and applicable occupancy chapters of the Life Safety Code. WHERE APPLICABLE NOTE EXCEPTIONS ONLY OF AREA IDENTIFIED AS BEING DEFICIENT DURING INSPECTION AND EXPLAIN IN SUFFICIENT DETAIL IN THE COMMENTS SECTION OF THIS FORM. TURN COMPLETED FORMS INTO THE LHS SAFETY OFFICER.

| PROJECT: | DATE | MON | TUE | WED | THR | FRI | SAT | SUN |
|---|------|-----|-----|-----|-----|-----|-----|-----|
| 1. Are exits readily accessible and provide unobstructed egress? | | | | | | | | |
| 2. If required, due to inaccessibility of existing, have alternate exits been established? | | | | | | | | |
| 3. If alternate exists have been established, are personnel in the area informed and aware of their relocation and existence? | | | | | | | | |
| 4. Are the existing and relocation exits clearly identified and able to be seen in the event of an emergency or fire? | | | | | | | | |
| 5. Are fire evacuation routes posted and do they reflect up-to-date changes and alternate escape routes due to construction deficiencies? | | | | | | | | |
| 6. Are written procedures and guidelines posted in the immediate and adjacent areas for what to do and who to call in the event of fire or emergency? | | | | | | | | |
| 7. Are personnel in the immediate and adjacent areas aware and informed as to the procedures and guidelines to follow in the event of fire or emergency? | | | | | | | | |
| 8. Do fire alarms, detection, and suppression equipment and systems appear to be operational? | | | | | | | | |
| 9. If the fire alarm or suppression systems are impaired or temporarily made nonfunctional has a fire watch, as required or necessary, of the area been established? | | | | | | | | |
| 10. If the existing fire alarm or suppression systems/equipment are impaired, have measures been taken to provide equivalent equipment/systems for adequate protection? Note date of installation for equivalent measures to the right. | | | | | | | | |
| 11. If the fire alarm or suppression systems are impaired, are the temporary equipment/systems being inspected and tested at least monthly? | | | | | | | | |
| 12. If temporary fire alarm or suppression systems are installed, are personnel in the area aware and informed on how to operate or utilize in the event of fire or emergency? | | | | | | | | |
| 13. Has the LHS "No Smoking" policy been posted, implemented and enforced in the construction area? | | | | | | | | |
| 14. Are construction/remodel area storage, waste and debris being maintained to minimize potential for fire or safety hazards during daily operations? | | | | | | | | |

Daily Intermediate Life Safety Measures (ILSM) Inspection Form (Continued)

| PROJECT: | DATE | MON | TUE | WED | THR | FRI | SAT | SUN |
|--|------|-----|-----|-----|-----|-----|-----|-----|
| 15. Are temporary partitions built to be smoke tight and of noncombustible/fire retardant materials to minimize spread of smoke or fire within the building? | | | | | | | | |
| 16. Do electrical panels, temporary wiring, extension cords, tools and equipment appear to be installed, utilized, and functioning in a safe manner? | | | | | | | | |
| 17. In general, are the exterior construction site, buildings, and ground free of hazard and potential safety violations? | | | | | | | | |
| 18. If there is any gas/arc welding or cutting being performed within the building or on site, have additional fire safety precautions been taken and the necessary equipment provided and utilized? | | | | | | | | |
| 19. If there is any gas/arc welding or cutting being performed within the building or on site, has the Plant Operations department been notified? | | | | | | | | |
| 20. If there are hand and safety rails required, are they in place and maintained in good condition? | | | | | | | | |
| 21. Are extension cords that are being used a 3 wire grounded type? | | | | | | | | |
| 22. If there are temporary electrical outlets provided, do they have ground fault protection at the receptacle or at the panel? | | | | | | | | |
| 23. If hazardous chemicals are present and/or being used, are they being limited to the amount needed and used daily? | | | | | | | | |
| 24. Are MSDS sheets readily available for any hazardous chemicals that are present or being used? | | | | | | | | |
| 25. Do ladders and scaffolds appear to be in satisfactory condition and being utilized in a safe manner? | | | | | | | | |
| 26. Is personnel protective equipment, such as safety glasses, hard hats and etc. needed or required and being used? | | | | | | | | |
| 27. If infection control is required, are the appropriate policies and procedures known and being followed? | | | | | | | | |
| 28. If electrical equipment needs to be de-energized, are applicable "Lockout/Tagout" procedures being followed? | | | | | | | | |
| PLACE INITIALS OF PERSON PERFORMING DAILY INSPECTION TO THE RIGHT. | | | | | | | | |

INSPECTION COMMENTS/FINDINGS: _____
 DATE PROJECT STARTED _____ DATE PROJECT COMPLETED _____
 PROJECT CE #: _____ GENERAL CONTRACTOR _____
 AREAS(S) OF PROJECT/JOB INSPECTED _____

SECTION 01 12 16
WORK SCHEDULE

PART 1 - GENERAL

1.1 DESCRIPTION:

Work Sequence requirements for 695-17-123 Repair and Replace Roofs Buildings 107 and 108.

1.2 GENERAL REQUIREMENTS

A. Contractor is responsible to prepare and maintain a construction schedule describing the sequencing, means-and-methods of construction, installation and removal of temporary facilities and protections and their impact and coordination with the Owner's continued occupation and operations.

1. Master Production Schedule shall be in the form of a bar graph (Gantt chart) using Critical Path Method (CPM), see Section 01 32 16.15 Project Schedules.

2. Schedule shall be submitted to the Resident Engineer / COR for review not later than 45 days after issuance of NTP.

3. For each Construction Progress Meeting, submit a 3-Week Short-Interval Production Schedule (SIPS) or Construction Activity Plan (CAP) to show current work in process. Schedule is to reflect trades on sight, days for each trade on site during the period, and list any and all issues/concerns/delays. Milestone dates shall be in agreement with the Master Production Schedule.

B. Sequencing, means-and-methods of construction, safety, and all temporary items remain the responsibility of the Contractor.

PRODUCTS (NOT USED)

EXECUTION (NOT USED)

- - - END - - -

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

PART 1- GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.
- B. The contractor may not mobilize and take possession of the construction site(s)/spaces until a schedule, in compliance with the details of this specification section, is approved and all required submittals for near-term work, safety requirements, documentation (OSH30, 10, safety plan, etc) and long lead time items as per other specifications sections are reviewed and approved by the COR.

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 (COR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. 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 COR, 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: copy of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports 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; an electronic file in the previously approved CPM schedule program. The

submittal shall also include a copy 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.

- D. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
1. Notify the Contractor concerning his actions, opinions, and objections.
 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line

copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

- E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- F. The Complete Project Schedule shall contain all work activities/events to identify the needed work on the project and in compliance with the requirements of the rest of this specification.

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. In accordance with VAAR 852.219 - 10 (VA NOTICE OF TOTAL SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS SET-ASIDE), 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.

- C. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
1. Show activities/events as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - 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.
 - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
 2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.

4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit an application and certificate for payment using VA Form 10-6001a 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 COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR 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 resident engineer 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 resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

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

1.10 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

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 COR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) 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.

1.13 VA REQUIRED INSPECTIONS (AS APPLICABLE BASED ON THE PROJECT SOW) :

| # | Inspections | Procedures / Comments | Attendees |
|---|--|---|--|
| 1 | Pre-site inspection of existing conditions | Inspect and identify what is to be salvaged to be turned over to the VA, demo'd, etc. Equipment to be tagged that will be turned over to the VA. Ensure easily removed items are removed and turned over to the VA. | User, contractor, PM, FM maintenance staff, FM Div Mgr, EMS Interior Designers |
| 2 | ACM containment | Inspect the containment barrier, ensure wall, floor and ceiling penetrations are sealed, decon containment set up, signage is installed, etc. | VA's ACM monitoring persons, contractor, contractor's ACM subcontractor, PM, VA FM A-team member |
| 3 | Demo completion | Inspect demolition to ensure no damage to areas/things not to be demolished, penetrations sealed, etc. | Contractor, PM, FM maintenance |
| 4 | After ACM clearance (prior to tear down) | Inspect the ACM removal to ensure everything has been removed. Identify additional ACM that may require an RFP or the A-team to remove. | VA's ACM monitoring persons, contractor, contractor's ACM subcontractor, PM, VA FM A-team member |
| 5 | Chalk line | Contractor has the walls marked in chalk on the floor. Attendees walk around and look at the layout, beds, carts, equipment that may be moved in and out should be brought to ensure the corners are not too tight, etc. Additionally, ensure chases are created only for utilities, not empty spaces. | User, contractor, PM, FM maintenance staff, FM Div Mgr |
| 6 | Stud wall | Inspect for installation of correct materials, location, etc. | Contractor, PM, FM maintenance staff |
| 7 | MEP outlet box | BEFORE CONDUIT AND BOXES ARE INSTALLED. Contractor and subcontractors walk around with the attendees and identify normal and emergency outlets, phone, data, card readers, push plates for doors, wall phones, etc with the drawings to ensure everything is marked. This includes the height above the floor, location on the wall, quantity, etc. Contractor should have all of these marked on the studs with tape or marker prior to the inspection. These devices can under most circumstances be moved a stud or two at no cost since the conduit is not installed. Additionally, the user may identify additional requirement not know during design and RFP will need to be issued to add these. | User, contractor, PM, FM maintenance staff, FM Div Mgr |
| 8 | MEP & Backing in-wall | Inspect utilities in the walls for seals, joints, etc. Inspect backing for location where items will be hung on the wall. | User, Contractor, PM, FM maintenance staff |

| | | | |
|---|--|--|--|
| 9 | MEP insulation | Inspect pipe and ductwork insulation, floor/ceiling penetrations for fire stopping, labeling, etc. | Contractor, PM, FM maintenance staff |
| 10 | Completion of Drywall | Inspect installation, mudding/taping, surface preparation/smoothness, etc. | Contractor, PM, FM maintenance staff |
| 11 | Above Ceiling | Inspect for valve and equipment tags, pipe labeling, junction boxes, pneumatic tube, conduit supports and cable trays, sprinkler piping, etc. | Contractor, PM, FM maintenance staff |
| 12 | Penetration inspection before ceiling grid | Inspect all smoke and fire walls for sealed penetrations. To identify the penetrations, can abbreviate on the drawing (d=duct, p=pipe, c=conduit, l=label, w=wall, etc.) Send the inspection to the contractor to correct. Re-inspection is needed. | Contract, PM, FM Maintenance, A-team member |
| 13 | Wall Hung Items; cabinets, mirrors, handrails, | Inspect for location, installed correctly, level, trims, etc. | User, contractor, PM, FM maintenance staff |
| 14 | Finishes and Trim | | Contractor, PM, FM Arch Shop, EMS Interior Designers, AE |
| 15 | Flooring Seam Layout | | Contractor, PM, Arch Shop, EMS Interior Designers, AE |
| 16 | Hardware | This is after installation. During submittals, there should be a meeting with the AE's hardware person, the contractor's hardware supplied, the user and the PM to review every door and the hardware specified. There are usually changes and an RFP is required, but that is easier that changing hardware after installation. | Contractor, PM, Locksmith, FM maintenance shops (for automatic doors) |
| 17 | Final finishes and flooring | Inspect seams, flatness, pattern, etc. for floors, wall smoothness, painting, corner guards, vinyl base, etc. | Contractor, PM, FM maintenance staff, FM Div Mgr |
| 18 | Commissioning / Equipment Testing | Contractor should have controls drawings, O&Ms, panel schedules, etc. Additionally, equipment should be reading at Graphics and there needs to be training with the Graphics operators as to where this equipment is, the settings and alarms, etc. | Contractor, PM, FM maintenance staff, EMS Interior Designers, FM Div Mgr |
| 19 | Pre-Final Inspection (Punchlist) | | User, contractor, PM, FM maintenance staff, FM Div Mgr |
| 20 | Final Inspection (Punchlist Verification) | | Contractor, PM, FM maintenance staff |
| Additional Inspection and testing depending on the project | | | |
| 21 | Floor Leveling and Floor Preparation | Prior to full floor leveling, the contractor should be providing elevations and then after the leveling to ensure the leveling is complete and within the tolerance allowed in the specifications. Also, prior to any floor installation, the floor should be | Contractor, PM, Arch Shop |

| | | | |
|----|-----------------------------|---|--------------------------------|
| | | inspected to ensure dust, debris, etc have been removed. | |
| 22 | Paint Prime Coat | Inspect the prime coat installed by the contractor prior to the additional paint layers being applied. | Contractor, PM, Arch Shop |
| 23 | Paint Color | Per specification 09 91 00, paragraph 1.6 Mock-up Panel, the contractor is to paint a 10 ft area for each paint color for inspection prior to painting the space. The AE should not be removing this from the specification. | Contractor, PM, Arch Shop |
| 24 | Duct Static Pressure Test | Per specification 23 31 00, paragraph 3.2 Duct Leakage Tests, the contractor is to perform leakage testing of the new ductwork prior to insulation being added. PM should witness this test and the contractor should be submitting a report. | Contractor, PM, AC Shop |
| 25 | Ceiling grid equipment tags | Inspect the ceiling grid for the color coded dots identifying equipment above the ceiling prior to installation of the acoustic ceiling tile. Also, this can be another check for equipment installation and labeling above the ceiling. | Contractor, PM, FM maintenance |

- - - E N D - - -

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

- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
 - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
 - A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
 - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be posted to Buzzsaw and shall contain the list of items, name of Medical Center Cemetery, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
 1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center,

- name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. Not used.
- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check. All information to be submitted to Buzzsaw.
1. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Samples shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to

(COR)

Facility Management

Clement J Zablocki VAMC

5000 West National Ave, 70E250

Milwaukee, WI 53295

- 1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Resident Engineer.
- 1-12. Samples for approval shall be sent to Architect-Engineer, in care of Resident Engineer, VA Medical Center.
- 1-13. Prior to submitting any submittals, contractor to submit a submittal log to the COR for approval identifying all the submittals required for the project as per the specifications and contract documents.

- - - E N D - - -

SECTION 01 35 26
SAFETY REQUIREMENTS

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**SECTION 01 35 26
SAFETY REQUIREMENTS**

1.1 APPLICABLE PUBLICATIONS:

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

B. American Society of Safety Engineers (ASSE):

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

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

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

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

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

D. The Facilities Guidelines Institute (FGI):

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

E. National Fire Protection Association (NFPA):

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

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

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

70-2014.....National Electrical Code

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

70E-2015Standard for Electrical Safety in the Workplace

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

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

F. The Joint Commission (TJC)

TJC ManualComprehensive Accreditation and Certification
Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20Standards for Protection Against Radiation

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

29 CFR 1904Reporting and Recording Injuries & Illnesses

29 CFR 1910Safety and Health Regulations for General
Industry

29 CFR 1926Safety and Health Regulations for Construction
Industry

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

I. VHA Directive 2005-007

1.2 DEFINITIONS:

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

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

- C. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- D. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- E. Accident/Incident Criticality Categories:

No impact - near miss incidents that should be investigated but are not required to be reported to the VA;

Minor incident/impact - incidents that require first aid or result in minor equipment damage (less than \$5000). These incidents must be investigated but are not required to be reported to the VA;

Moderate incident/impact - Any work-related injury or illness that results in:

1. Days away from work (any time lost after day of injury/illness onset);
2. Restricted work;
3. Transfer to another job;
4. Medical treatment beyond first aid;
5. Loss of consciousness;
6. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (5) above or,
7. any incident that leads to major equipment damage (greater than \$5000).

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

Major incident/impact - Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of

contractors' activities. Or any incident which leads to major property damage (greater than \$20,000) and/or may generate publicity or high visibility. These incidents must be investigated and are required to be reported to the VA as soon as practical, but not later than 2 hours after the incident.

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

1.3 REGULATORY REQUIREMENTS:

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

1.4 ACCIDENT PREVENTION PLAN (APP):

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

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

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

f. TRAINING.

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

g. SAFETY AND HEALTH INSPECTIONS.

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

h. ACCIDENT/INCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all Moderate and Major as well as all High Visibility Incidents. The APP shall include accident/incident investigation procedure and identify person(s) responsible to provide the following to the COR Designated Authority:

- 1) Exposure data (man-hours worked);

- 2) Accident investigation reports;
- 3) Project site injury and illness logs.

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

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

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

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

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

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the COR. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public and the environment.

1.5 ACTIVITY HAZARD ANALYSES (AHAS):

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

requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

3. Submit AHAs to the COR Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.
5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the COR Designated Authority.

1.6 PRECONSTRUCTION CONFERENCE:

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.
- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

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

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations). However, the SSHO has be a separate qualified individual from the Prime Contractor's Superintendent and/or Quality Control Manager with duties only as the SSHO.
- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.
- E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

1.8 TRAINING:

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures,

accident reporting etc... Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.

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

1.9 INSPECTIONS:

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to COR.
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
 - 1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
 - 2. The COR will be notified immediately prior to start of the inspection and invited to accompany the inspection.
 - 3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
 - 4. A report of the inspection findings with status of abatement will be provided to the COR within one week of the onsite inspection.

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

- A. The prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental

property damage (both government and contractor) that occur on site. Notify the COR as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the COR determine whether a government investigation will be conducted.

- B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162 (or equivalent), and provide the report to the COR Designated Authority within 5 calendar days of the accident. The COR will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the COR monthly.
- D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the COR monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the COR as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
 - 1. Hard Hats - unless written authorization is given by the COR in circumstances of work operations that have limited potential for

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

1.12 INFECTION CONTROL

- A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas. Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.
- B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the COR Designated Authority before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the COR The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is: **Class I**, however, work outside the primary project scope

area may vary. The required infection control precautions with each class are as follows:

1. Class I requirements:

a. During Construction Work:

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

b. Upon Completion:

- 1) Clean work area upon completion of task
- 2) Notify the COR

2. Class II requirements:

a. During Construction Work:

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

b. Upon Completion:

- 1) Wipe work surfaces with cleaner/disinfectant.
- 2) Contain construction waste before transport in tightly covered containers.

- 3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
 - 4) Upon completion, restore HVAC system where work was performed
 - 5) Notify the COR
3. Class III requirements:
- a. During Construction Work:
 - 1) Obtain permit from the COR
 - 2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
 - 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
 - 4) Maintain negative air pressure, 0.02 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
 - 5) Contain construction waste before transport in tightly covered containers.
 - 6) Cover transport receptacles or carts. Tape covering unless solid lid.

- b. Upon Completion:
 - 1) Do not remove barriers from work area until completed project is inspected by the COR and thoroughly cleaned by the VA Environmental Services Department.
 - 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
 - 3) Vacuum work area with HEPA filtered vacuums.
 - 4) Wet mop area with cleaner/disinfectant.
 - 5) Upon completion, restore HVAC system where work was performed.
 - 6) Return permit to the COR
4. Class IV requirements:
 - a. During Construction Work:
 - 1) Obtain permit from the COR
 - 2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.
 - 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
 - 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
 - 5) Seal holes, pipes, conduits, and punctures.

- 6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
- 7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.

b. Upon Completion:

- 1) Do not remove barriers from work area until completed project is inspected by the COR with thorough cleaning by the VA Environmental Services Dept.
- 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
- 3) Contain construction waste before transport in tightly covered containers.
- 4) Cover transport receptacles or carts. Tape covering unless solid lid.
- 5) Vacuum work area with HEPA filtered vacuums.
- 6) Wet mop area with cleaner/disinfectant.
- 7) Upon completion, restore HVAC system where work was performed.
- 8) Return permit to the COR

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

1. Class III and IV - closed door with VA-approved tape applied over the frame and door is acceptable for projects that can be contained in a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:

- a. Class III & IV (where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with VA-approved tape to prevent dust and debris from escaping
 - b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
 - c. Class III & IV - Seal all penetrations in existing barrier airtight
 - d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris
 - e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing
 - f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.
- D. Products and Materials:
1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes
 2. Barrier Doors: Self Closing One-hour solid core wood in steel frame, painted
 3. Dust proof one-hour drywall
 4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other pre-filter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer's instructions.

5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
 6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
 7. Disinfectant: Hospital-approved disinfectant or equivalent product
 8. Portable Ceiling Access Module
- E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- F. A dust control program will be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- G. Medical center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
 2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.

3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
5. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with VA-approved tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

I. Final Cleanup:

1. Upon completion remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.

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

J. Exterior Construction

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

1.13 TUBERCULOSIS SCREENING

- A. Contractor shall provide written certification that all contract employees assigned to the work site have had a pre-placement tuberculin screening within 90 days prior to assignment to the worksite and been found have negative TB screening reactions. Contractors shall be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site. NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step skin testing or a Food and Drug Administration (FDA)-approved blood test.
 1. Contract employees manifesting positive screening reactions to the tuberculin shall be examined according to current CDC guidelines prior to working on VHA property.
 2. Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician shall be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.
 3. If the employee is found with evidence of active (infectious) pulmonary TB, the employee shall require treatment with a subsequent

statement to the fact on file with the employer before being allowed to return to work on VHA property.

1.14 FIRE SAFETY

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.
- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
 - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board 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, ¼ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one-hour temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
 - 3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-

penetration firestop materials in accordance with Section 07 84 00,
FIRESTOPPING.

- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COR.
- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COR.
- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Standpipes: Install and extend standpipes up with each floor in accordance with 29 CFR 1926 and NFPA 241. Do not charge wet standpipes subject to freezing until weather protected.
- K. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with COR. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COR.

- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B.
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COR.
- P. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.15 ELECTRICAL

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

determination if the circumstances would meet the exception outlined above. An AHA and permit specific to energized work activities will be developed, reviewed, and accepted by the VA prior to the start of that activity.

1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.
 2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
 3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the COR.
- D.** Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity and permit for energized work has been reviewed and accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
- E.** Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125-volt, 15-, 20-, or 30-ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be

implemented in accordance with NFPA 70E - 2015, Chapter 1, Article 110.4(C)(2).

1.16 FALL PROTECTION

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

1.17 SCAFFOLDS AND OTHER WORK PLATFORMS

- A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.
- B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.
- C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
 - 1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.

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

1.18 EXCAVATION AND TRENCHES

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

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

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

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetrometer will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5 Tons/FT² - Type C, 0.5 Tons/FT² to 1.5 Tons/FT² - Type B, greater than 1.5 Tons/FT² - Type A without condition to reduce to Type B).
2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.

3. Indication of the spoil pile being stored at least 2 feet from the edge of the excavation and safe access being provided within 25 feet of the workers.
 4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.
- C. As required by OSHA 29 CFR 1926.651(b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.
1. The planned dig site will be outlined/marked in white prior to locating the utilities.
 2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.
 3. 811 will be called two business days before digging on all local or State lands and public Right-of Ways.
 4. Digging will not commence until all known utilities are marked.
 5. Utility markings will be maintained
- D. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within 3 to 5 feet of identified underground utilities. Exploratory bar or other detection equipment will be utilized as necessary to further identify the location of underground utilities.
- E. Excavations greater than 20 feet in depth require a Professional Engineer designed excavation protective system.

1.19 CRANES

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
- B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date.
- C. A detailed lift plan for all lifts shall be submitted to the COR 21 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document.
- D. Crane operators shall not carry loads
 - 1. over the general public or VAMC personnel
 - 2. over any occupied building unless
 - a. the top two floors are vacated
 - b. or overhead protection with a design live load of 300 psf is provided

1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

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

1.21 CONFINED SPACE ENTRY

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

1.22 WELDING AND CUTTING

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

1.23 LADDERS

- A. All Ladder use shall comply with 29 CFR 1926 Subpart X.
- B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels shall be in place on ladders
- D. Step Ladders shall not be used in the closed position
- E. Top steps or cap of step ladders shall not be used as a step
- F. Portable ladders, used as temporary access, shall extend at least 3 ft (0.9 m) above the upper landing surface.
 - 1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.
 - 2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.
- G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.24 FLOOR & WALL OPENINGS

- A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.
- B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. Skylights located in floors or roofs are considered floor or roof hole/openings.
- C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
 - 1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
 - 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.
 - 3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
 - 4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
 - 5. Workers are prohibited from standing/walking on skylights.

- - - E N D - - -

Milwaukee VAMC

SECTION 01 42 19
REFERENCE STANDARDS
05-01-16

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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

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

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

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

Milwaukee VAMC

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

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

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

- AA Aluminum Association Inc.
<http://www.aluminum.org>
- AABC Associated Air Balance Council
<http://www.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.acgih.org>
- ACI American Concrete Institute
<http://www.aci-int.net>
- ACPA American Concrete Pipe Association
<http://www.concrete-pipe.org>
- ACPPA American Concrete Pressure Pipe Association
<http://www.acppa.org>
- ADC Air Diffusion Council
<http://flexibleduct.org>

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- AGA American Gas Association
<http://www.aga.org>
- AGC Associated General Contractors of America
<http://www.agc.org>
- AGMA American Gear Manufacturers Association, Inc.
<http://www.agma.org>
- AHAM Association of Home Appliance Manufacturers
<http://www.aham.org>
- AIA American Institute of Architects
<http://www.aia.org>
- AISC American Institute of Steel Construction
<http://www.aisc.org>
- AISI American Iron and Steel Institute
<http://www.steel.org>
- AITC American Institute of Timber Construction
<http://www.aitc-glulam.org>
- AMCA Air Movement and Control Association, Inc.
<http://www.amca.org>
- ANLA American Nursery & Landscape Association
<http://www.anla.org>
- ANSI American National Standards Institute, Inc.
<http://www.ansi.org>
- APA The Engineered Wood Association
<http://www.apawood.org>
- ARI Air-Conditioning and Refrigeration Institute
<http://www.ari.org>
- ASAE American Society of Agricultural Engineers
<http://www.asae.org>

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- ASCE American Society of Civil Engineers
<http://www.asce.org>
- ASHRAE American Society of Heating, Refrigerating, and
Air-Conditioning Engineers
<http://www.ashrae.org>
- ASME American Society of Mechanical Engineers
<http://www.asme.org>
- ASSE American Society of Sanitary Engineering
<http://www.asse-plumbing.org>
- ASTM American Society for Testing and Materials
<http://www.astm.org>
- AWI Architectural Woodwork Institute
<http://www.awinet.org>
- AWS American Welding Society
<http://www.aws.org>
- AWWA American Water Works Association
<http://www.awwa.org>
- BHMA Builders Hardware Manufacturers Association
<http://www.buildershardware.com>
- BIA Brick Institute of America
<http://www.bia.org>
- CAGI Compressed Air and Gas Institute
<http://www.cagi.org>
- CGA Compressed Gas Association, Inc.
<http://www.cganet.com>
- CI The Chlorine Institute, Inc.
<http://www.chlorineinstitute.org>
- CISCA Ceilings and Interior Systems Construction Association
<http://www.cisca.org>

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

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

CPMB Concrete Plant Manufacturers Bureau
<http://www.cpmb.org>

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

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

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

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

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

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

EPA Environmental Protection Agency
<http://www.epa.gov>

ETL ETL Testing Laboratories, Inc.
<http://www.etl.com>

FAA Federal Aviation Administration
<http://www.faa.gov>

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

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

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GANNA Glass Association of North America
<http://www.cssinfo.com/info/gana.html/>

FM Factory Mutual Insurance
<http://www.fmglobal.com>

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

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

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

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

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

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

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

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

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

IPCEA Insulated Power Cable Engineers Association

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

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

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

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

NBS National Bureau of Standards
See - NIST

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

NEC National Electric Code
See - NFPA National Fire Protection Association

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RIS Redwood Inspection Service
See - CRA

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

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

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

SOI Secretary of the Interior
http://www.cr.nps.gov/local-law/arch_stnds_8_2.htm

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

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

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

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

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

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

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

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

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

UBC The Uniform Building Code
See ICBO

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

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

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

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

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

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
1. Adversely effect human health or welfare,
 2. Unfavorably alter ecological balances of importance to human life,
 3. Effect other species of importance to humankind, or;
 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

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

1.2 QUALITY CONTROL

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

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):
33 CFR 328.....Definitions

1.4 SUBMITTALS

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.

- e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.

- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 4. Temporary Protection of Disturbed Areas: NA
 5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features on the Environmental Protection Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains,

- sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 7. Manage and control spoil areas on Government property to limit spoil to areas on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby water courses or lakes.
 8. Protect adjacent areas from despoilment by temporary excavations and embankments.
 9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 11. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
 3. Monitor water areas affected by construction.
- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Wisconsin DRN and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
 3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- 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 COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

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

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

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

- b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at

900 to 1800 mm (three to six feet) in front of any building face.

Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.

- G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT
09-01-13

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Contractor is required to restore all finishes, surfaces, items, & materials as required accommodating new finishes. For example, if wall paper, vinyl wall covering, ceramic wall tile, etc. is existing on wall, and new wall finish calls for wall to be painted, contractor is required to remove existing wall paper, vinyl wall covering, ceramic wall tile, etc. to accommodate new painted finish. These surfaces are required to be verified prior to bid, as no change to contract will be provided after award if existing finishes are clearly present.
- C. 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.
- D. 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.
- E. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.

9. Plastics (eg, ABS, PVC).
10. Carpet and/or pad.
11. Gypsum board.
12. Insulation.
13. Paint.
14. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

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

provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.

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

1.4 TERMINOLOGY

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

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

1.5 SUBMITTALS

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

1.6 APPLICABLE PUBLICATIONS

- A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation

only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

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

LEED Green Building Rating System for New Construction

1.7 RECORDS

- A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.
- B. Separate out materials and recycle them. Submit report from construction and demolition "recycle" facility. One such facility that can/has been used is the Waste Management C&D Recycling facility (formerly City Wide Recycling), 10700 West Brown Deer Road, Milwaukee, WI, 53224. Phone number is (414) 355 - 6500. Plant manager is Mike Miller. This Waste Management facility will give contractor estimated weight of recycled materials including LEED report identifying drywall, inert materials (bricks, concrete, etc.), metals, old cardboard, wood recycled and the approximate amount of materials that cannot be recycled --- which is then landfilled. Other facilities offering similar reporting and methods can be proposed by Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 COLLECTION

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

3.2 DISPOSAL

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

3.3 REPORT

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

Table 1: Materials Removed

Project Name: _____ Location: _____ Project Contractor: _____
 COR: _____
 Date: _____

| Material Being Reused/Recycled | Reused/Recycled | Quantity (lbs or cubic yards) | Recycler/ Location | Comments |
|--------------------------------|-----------------|-------------------------------|--------------------|----------|
| Masonry | | | | |
| Concrete | | | | |
| Scrap Metals | | | | |
| Packaging | | | | |
| Drywall | | | | |
| Wood | | | | |
| Plumbing Fixtures | | | | |
| Glass | | | | |
| Plastics (noncontaminated) | | | | |
| Acoustical Ceiling Tile | | | | |
| Wire | | | | |
| Light Fixtures | | | | |
| Lamps | | | | |
| Ballasts | | | | |
| Carpeting | | | | |
| | | | | |
| | | | | |
| | | | | |

Table 2: Materials Installed

Project Name: _____ Location: _____ Project Contractor: _____
 COR: _____
 Date: _____

KEY:

- (R) = Recycled Content
- (ES) = Energy Star
- (BP) = Biobased Product
- (FEMP) = FEMP-Designated Product

Product: What specific product was purchased?

"Green" Content: What makes it green? % recycled, biobased, energy star, etc.

| Material | Product | "Green" Content | Manufacturer | Comments |
|---------------------------------------|---------|-----------------|--------------|----------|
| Appliances (R) | | | | |
| Bathroom Fixtures (R) | | | | |
| Building Insulation (R,ES) | | | | |
| Cement and Concrete (R) | | | | |
| Composite panels (BP) | | | | |
| Doors and skylights (ES) | | | | |
| Floor tiles (R) | | | | |
| Laminated paperboard (R) | | | | |
| Structural fiberboard | | | | |
| Roofing materials (R, BP, ES) | | | | |
| Windows (ES) | | | | |
| Office furniture | | | | |
| Carpet (R) | | | | |
| Carpet cushion (R) | | | | |
| Compact fluorescent lamps (CFLs) (ES) | | | | |
| Decorative light strings (ES) | | | | |
| Downlight luminaires (FEMP) | | | | |
| Fluorescent ballasts (FEMP) | | | | |
| Fluorescent luminaires (FEMP) | | | | |
| Fluorescent tube lamps (FEMP) | | | | |
| LED lighting | | | | |
| Light fixtures (ES) | | | | |
| Lighting controls (FEMP) | | | | |
| Mats (R) | | | | |
| Paint -- consolidated latex paint (R) | | | | |
| Paint -- reprocessed latex paint (R) | | | | |
| Bike racks (R) | | | | |
| Plastic fencing (R) | | | | |
| Signage (R) | | | | |
| Adhesive and Mastic Removers (BP) | | | | |

| | | | | |
|---|--|--|--|--|
| Carpet and Upholstery Cleaners - General Purpose (BP) | | | | |
| Carpet and Upholstery Cleaners - Spot Removers (BP) | | | | |
| Dust Suppressants (BP) | | | | |
| Floor Strippers (BP) | | | | |
| Graffiti and Grease Removers (BP) | | | | |
| Sorbents (BP) | | | | |
| Mats (R) | | | | |
| Wood and concrete sealers (BP) | | | | |

Appendix A:
Sample Construction Waste Management Plan.

- - - E N D - - -

SECTION 01 81 13

SUSTAINABLE CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes general requirements and procedures to comply with federal mandates and U.S. Department of Veterans Affairs (VA) policies for sustainable construction as summarized in the VA Sustainable Design Manual.
- B. The Design Professional has selected materials and utilized integrated design processes that achieve the Government's objectives. Contractor is responsible to maintain and support these objectives in developing means and methods for performing work and in proposing product substitutions or changes to specified processes. By submitting a change or substitution of materials or processes, contractor must demonstrate its diligence in performing the level of investigation and comparison required under federal mandates and VA policies.

1.2 RELATED WORK

- A. Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.
- B. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- C. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

1.3 DEFINITIONS

- A. Total Materials Cost: A tally of actual material cost from specification divisions 03 through 10, 31 (applicable to foundations) and 32 (applicable to paving, site improvements, and planting). Alternatively, 45 percent of total construction hard costs in those specification divisions.
- B. Recycled Content: Recycled content of materials is defined according to Federal Trade Commission Guides for the Use of Environmental Marketing Claims (16 CFR Part 260). Recycled content value of a material assembly is determined by weight. Recycled fraction of assembly is multiplied by cost of assembly to determine recycled content value.
 - 1. "Post-Consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Pre-Consumer" material is defined as material diverted from waste stream during the manufacturing process. Excluded is reutilization

of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

- C. Biobased Products: Biobased products are derived from plants and other renewable agricultural, marine, and forestry materials and provide an alternative to conventional petroleum derived products. Biobased products include diverse categories such as lubricants, cleaning products, inks, fertilizers, and bioplastics.
- D. Low Pollutant-Emitting Materials: Materials and products which are minimally odorous, irritating, or harmful to comfort and well-being of installers and occupants.
- E. Volatile Organic Compounds (VOC): Chemicals that are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

1.4 REFERENCE STANDARDS

- A. Carpet and Rug Institute Green Label Plus program.
- B. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).
- C. U.S. Environmental Protection Agency Comprehensive Procurement Guidelines (CPG).
- D. U.S. Environmental Protection Agency WaterSense Program (WaterSense).
- E. U.S. Environmental Protection Agency ENERGY STAR Program (ENERGY STAR).
- F. U. S. Department of Energy Federal Energy Management Program (FEMP).
- G. Green Electronic Council EPEAT Program (EPEAT).

1.5 SUBMITTALS

- A. All submittals to be provided by contractor to COR/Resident Engineer and Architect.
- B. Sustainability Action Plan:
 - 1. Submit documentation as required by this section; provide additional copies of typical submittals required under technical sections when sustainable construction requires copies of record submittals.
 - 2. Within 30 days after Preconstruction Meeting provide a narrative plan for complying with requirements stipulated within this section.
 - 3. Sustainability Action Plan must:
 - a. Make reference to sustainable construction submittals defined by this section.
 - b. Address all items listed under PERFORMANCE CRITERIA.
 - c. Indicate individual(s) responsible for implementing the plan.

- C. Project Materials Cost Data Spreadsheet: Within 30 days after the Preconstruction Meeting provide a preliminary Project Materials Cost Data Spreadsheet. The Project Materials Cost Data Spreadsheet must be an electronic file and indicate all materials in Divisions 3 through 10, 31, and 32 used for Project (excluding labor costs and excluding all mechanical, electrical, and plumbing system components), and be organized by specification section. The spreadsheet must include the following:
1. Identify each reused or salvaged material, its cost, and its replacement value.
 2. 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 post-consumer recycled content value plus one-half of pre-consumer recycled content value, and total combined recycled content value for all materials as a percentage of total materials costs.
 3. Identify each biobased material, its source, its cost, and total value of biobased materials as a percentage of total materials costs.
 4. Total cost for Project and total cost of building materials used for Project.
- D. Construction Indoor Air Quality (IAQ) Management Plan:
1. Not more than 30 days after Preconstruction Meeting provide a Construction IAQ Management Plan as an electronic file including descriptions of the following:
 - a. Instruction procedures for meeting or exceeding minimum requirements of ANSI/SMACNA 008-2008, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling.
 - b. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage.
 - c. Schedule of submission of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials.
 - d. Instruction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille.

- e. 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.
 - f. Instruction procedures and schedule for implementing building flush-out.
- E. Product Submittals:
- 1. Recycled Content: Submit product data from manufacturer indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content (excluding MEP systems equipment and components).
 - 2. Biobased Content: Submittals for products to be installed or used included on the USDA BioPreferred program's product category lists. Data to include biobased content and source of biobased material; indicating name of manufacturer, cost of each material.
 - 3. For applicable products and equipment, product documentation confirming Energy Star label and EPEAT certification.
- F. Sustainable Construction Progress Reports: Concurrent with each Application for Payment, submit a Sustainable Construction Progress Report to confirm adherence with Sustainability Action Plan.
- 1. Include narratives of revised strategies for bringing work progress into compliance with plan and product submittal data and calculations to demonstrate compliance with thresholds based on materials costs.
 - 2. Include updated and current Project Materials Cost Data Spreadsheet.
 - 3. Include updated and current Low Pollutant-Emitting Materials Tracking Spreadsheet.
 - 4. Include construction waste tracking, in tons or cubic yards, including waste description, whether diverted or landfilled, hauler, and percent diverted for comingled quantities; and excluding land-clearing debris and soil. Provide haul receipts and documentation of diverted percentages for comingled wastes.
- G. Closeout Submittals: Within 14 days after Substantial Completion provide the following:
- 1. Final version of Project Material Cost Data Spreadsheet.
 - 2. Final version of Low Pollutant-Emitting Materials Tracking Spreadsheet.

3. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed air handling units are used during construction.
4. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for final filtration media in air handling units.
5. Flush-out Documentation:
 - a. Product data for filtration media used during flush-out.
 - b. Product data for filtration media installed immediately prior to occupancy.
 - c. Signed statement describing building air flush-out procedures including dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

1.6 QUALITY ASSURANCE

- A. Preconstruction Meeting: After award of Contract and prior to commencement of Work, schedule and conduct meeting with COR/Resident Engineer and Architect to discuss the Project Sustainable Action Plan content as it applies to submittals, project delivery, required Construction Indoor Air Quality (IAQ) Management Plan, and other Sustainable Construction Requirements. The purpose of this meeting is to develop a mutual understanding of the Sustainable Construction Requirements and coordination of contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.
- B. Construction Job Conferences: Status of compliance with Sustainable Construction Requirements of these specifications will be an agenda item at regular job meetings conducted during the course of work at the site.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.
- C. Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
- D. Green Seal Standard GC-36, Commercial Adhesives, October 19, 2000.

- E. South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
- F. South Coast Air Quality Management District (SCAQMD) Rule 1168, July 1, 2005 and rule amendment date of January 7, 2005.
- G. Sheet Metal and Air Conditioning National Contractors' Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition (ANSI/SMACNA 008-2008), Chapter 3.
- H. Federal Trade Commission Guides for the Use of Environmental Marketing Claims (16 CFR Part 260).
- I. ASHRAE Standard 52.2-2007.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. Construction waste diversion from landfill disposal must comprise at least 50 percent of total construction waste, excluding land clearing debris and soil. Alternative daily cover (ADC) does not qualify as material diverted from disposal.
- B. Low Pollutant-Emitting Materials:
 - 1. Adhesives, sealants and sealant primers applied on site within the weatherproofing membrane must comply with VOC limits of SCAQMD Rule 1168:
 - a. Flooring Adhesives and Sealants:
 - 1) Indoor carpet adhesives: 50 g/L.
 - 2) Wood Flooring Adhesive: 100 g/L.
 - 3) Rubber Floor Adhesives: 60 g/L.
 - 4) Subfloor Adhesives: 50 g/L.
 - 5) Ceramic Tile Adhesives and Grout: 65 g/L.
 - 6) Cove Base Adhesives: 50 g/L.
 - 7) Multipurpose Construction Adhesives: 70 g/L.
 - 8) Porous Material (Except Wood) Substrate: 50 g/L.
 - 9) Wood Substrate: 30 g/L.
 - 10) Architectural Non-Porous Sealant Primer: 250 g/L.
 - 11) Architectural Porous Sealant Primer: 775 g/L.
 - 12) Other Sealant Primer: 750 g/L.
 - 13) Structural Wood Member Adhesive: 140 g/L.
 - 14) Sheet-Applied Rubber Lining Operations: 850 g/L.
 - 15) Top and Trim Adhesive: 250 g/L.
 - 16) Architectural Sealant: 250 g/L.
 - 17) Other Sealant: 420 g/L.

- b. Non-Flooring Adhesives and Sealants:
 - 1) Drywall and Panel Adhesives: 50 g/L.
 - 2) Multipurpose Construction Adhesives: 70 g/L.
 - 3) Structural Glazing Adhesives: 100 g/L.
 - 4) Metal-to-Metal Substrate Adhesives: 30 g/L.
 - 5) Plastic Foam Substrate Adhesive: 50 g/L.
 - 6) Porous Material (Except Wood) Substrate Adhesive: 50 g/L.
 - 7) Wood Substrate Adhesive: 30 g/L.
 - 8) Fiberglass Substrate Adhesive: 80 g/L.
 - 9) Architectural Non-Porous Sealant Primer: 250 g/L.
 - 10) Architectural Porous Sealant Primer: 775 g/L.
 - 11) Other Sealant Primer: 750 g/L.
 - 12) PVC Welding Adhesives: 510 g/L.
 - 13) CPVC Welding Adhesives: 490 g/L.
 - 14) ABS Welding Adhesives: 325 g/L.
 - 15) Plastic Cement Welding Adhesives: 250 g/L.
 - 16) Adhesive Primer for Plastic: 550 g/L.
 - 17) Contact Adhesive: 80 g/L.
 - 18) Special Purpose Contact Adhesive: 250 g/L.
 - 19) Structural Wood Member Adhesive: 140 g/L.
 - 20) Sheet Applied Rubber Lining Operations: 850 g/L.
 - 21) Top and Trim Adhesive: 250 g/L.
 - 22) Architectural Sealants: 250 g/L.
 - 23) Other Sealants: 420 g/L.
- 2. Aerosol adhesives applied on site within the weatherproofing membrane must comply with the following Green Seal GS-36.
 - a. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent VOCs by weight.
 - b. Aerosol Adhesive, General-Purpose Web Spray: 55 percent VOCs by weight.
 - c. Special-Purpose Aerosol Adhesive (All Types): 70 percent VOCs by weight.
- 3. Paints and coatings applied on site within the weatherproofing membrane must comply with the following criteria:
 - a. VOC content limits for paints and coatings established in Green Seal Standard GS-11.

- b. VOC content limit for anti-corrosive and anti-rust paints applied to interior ferrous metal substrates of 250 g/L established in Green Seal GC-03.
- c. Clear wood finishes, floor coatings, stains, primers, sealers, and shellacs applied to interior elements must not exceed VOC content limits established in SCAQMD Rule 1113.
- d. Comply with the following VOC content limits:
 - 1) Anti-Corrosive/Antirust Paints: 250 g/L.
 - 2) Clear Wood Finish, Lacquer: 550 g/L.
 - 3) Clear Wood Finish, Sanding Sealer: 350 g/L.
 - 4) Clear Wood Finish, Varnish: 350 g/L.
 - 5) Floor Coating: 100 g/L.
 - 6) Interior Flat Paint, Coating or Primer: 50 g/L.
 - 7) Interior Non-Flat Paint, Coating or Primer: 150 g/L.
 - 8) Sealers and Undercoaters: 200 g/L.
 - 9) Shellac, Clear: 730 g/L.
 - 10) Shellac, Pigmented: 550 g/L.
 - 11) Stain: 250 g/L.
 - 12) Clear Brushing Lacquer: 680 g/L.
 - 13) Concrete Curing Compounds: 350 g/L.
 - 14) Japans/Faux Finishing Coatings: 350 g/L.
 - 15) Magnesite Cement Coatings: 450 g/L.
 - 16) Pigmented Lacquer: 550 g/L.
 - 17) Waterproofing Sealers: 250 g/L.
 - 18) Wood Preservatives: 350 g/L.
 - 19) Low-Solids Coatings: 120 g/L.
- 4. Carpet installed in building interior must comply with one of the following:
 - a. Meet testing and product requirements of the Carpet and Rug Institute Green Label Plus program.
 - b. Maximum VOC concentrations specified in CDPH Standard Method V1.1-2010, using office scenario at the 14 day time point.
- 5. Each non-carpet flooring element installed in building interior which is not inherently non-emitting (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) must comply with one of the following:

- a. Meet requirements of the FloorScore standard as shown with testing by an independent third-party.
 - b. Maximum VOC concentrations specified in CDPH Standard Method V1.1-2010, using office scenario at 14 day time point.
 2. Composite wood and agrifiber products used within the weatherproofing membrane must contain no added urea-formaldehyde resins.
 3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies must not contain added urea-formaldehyde.
- B. Recycled Content:
1. Any product being installed or used that are listed on EPA Comprehensive Procurement Guidelines designated product list must meet or exceed the EPA's recycled content recommendations. The EPA Comprehensive Procurement Guidelines categories include:
 - a. Building insulation.
 - b. Cement and concrete.
 - c. Consolidated and reprocessed latex paint.
 - d. Floor tiles.
 - e. Flowable fill.
 - f. Laminated paperboard.
 - g. Modular threshold ramps.
 - h. Nonpressure pipe.
 - i. Patio blocks.
 - j. Railroad grade crossing surfaces.
 - k. Roofing materials.
 - l. Structural fiberboard.
 - m. Plastic lumber landscaping timbers and posts.
 - n. Plastic fencing.
 2. 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 cost of materials used for Project, exclusive of mechanical, electrical and plumbing components, specialty items such as elevators, and labor and delivery costs.
- C. Biobased Content:
1. Materials and equipment being installed or used that are listed on the USDA BioPreferred program product category list must meet or

exceed USDA's minimum biobased content threshold. Refer to individual specification sections for detailed requirements applicable to that section.

a. USDA BioPreferred program categories include:

- 1) Adhesive and Mastic Removers.
- 2) Cleaners.
- 3) Composite Panels.
- 4) Corrosion Preventatives.
- 5) Erosion Control Materials.
- 6) Dust Suppressants.
- 7) Floor Cleaners and Protectors.
- 8) Floor Coverings (Non-Carpet).
- 9) Glass Cleaners.
- 10) Hydraulic Fluids.
- 11) Industrial Cleaners.
- 12) Interior Paints and Coatings.
- 13) Multipurpose Cleaners.
- 14) Multipurpose Lubricants.
- 15) Packaging Films.
- 16) Paint Removers.
- 17) Plastic Insulating Foam.
- 18) Pneumatic Equipment Lubricants.
- 19) Roof Coatings.
- 20) Wastewater Systems Coatings.
- 21) Wood and Concrete Sealers.
- 22) Wood and Concrete Stains.

E. Materials, products, and equipment being installed which fall into a category covered by the WaterSense program must be WaterSense-labeled or meet or exceed WaterSense program performance requirements, unless disallowed for infection control reasons.

F. Materials, products, and equipment being installed which fall into a category covered by the Energy Star program must be Energy Star-labeled.

1. Energy Star product categories as of 05/19/2015 include:

a. Appliances:

- 1) Air Purifiers and Cleaners.
- 2) Clothes Dryers (Residential).
- 3) Clothes Washers (Commercial).

- 4) Clothes Washers (Residential).
 - 5) Dehumidifiers.
 - 6) Dishwashers (Residential).
 - 7) Freezers (Residential).
- b. Electronics and Information Technology:
- 1) Audio/Video Equipment.
 - 2) Computers: Desktops, Workstations, and Thin Clients.
 - 3) Computers: Notebooks and Integrated Computers.
 - 4) Small-Scale Servers.
 - 5) Data Center Storage.
 - 6) Displays.
 - 7) Enterprise Servers.
 - 8) Imaging Equipment.
 - 9) Set-Top and Cable Boxes.
 - 10) Telephones.
 - 11) Televisions.
 - 12) Uninterruptible Power Supplies.
- c. Food Service Equipment (Commercial):
- 1) Dishwashers.
 - 2) Fryers.
 - 3) Griddles.
 - 4) Hot Food Holding Cabinets.
 - 5) Ice Machines, Air-Cooled.
 - 6) Ovens.
 - 7) Refrigerated Beverage Vending Machines.
 - 8) Refrigerators and Freezers.
 - 9) Steam Cookers.
- d. Heating and Cooling Equipment:
- 1) Air-Source Heat Pumps (Residential).
 - 2) Boilers (Residential).
 - 3) Ceiling Fans (Residential).
 - 4) Central Air Conditioners (Residential).
 - 5) Gas Furnaces (Residential).
 - 6) Gas Storage Water Heaters (Residential).
 - 7) Gas Water Heaters (Commercial).
 - 8) Geothermal Heat Pumps (Residential).
 - 9) Heat Pump Water Heaters (Residential).
 - 10) Light Commercial Heating and Cooling Equipment.

- 11) Room Air Conditioners (Residential).
 - 12) Solar Water Heaters (Residential).
 - 13) Ventilation Fans (Residential).
 - 14) Whole-Home Tankless Water Heaters (Residential).
- e. Other:
- 1) Cool Roof Products.
 - 2) Decorative Light Strings.
 - 3) Pool Pumps.
 - 4) Water Coolers.
 - 5) Windows, Doors, and Skylights.
- G. Materials, products, and equipment being installed which fall into a category covered by the FEMP program must be FEMP-designated. FEMP-designated product categories as of 05/19/2015 include:
1. Food Service Equipment (Commercial):
 - a. Ice Machines, Water-Cooled.
 2. Heating and Cooling Equipment:
 - a. Boilers (Commercial).
 - b. Electric Chillers, Air-Cooled (Commercial).
 - c. Electric Chillers, Water-Cooled (Commercial).
 - d. Electric Resistance Water Heaters (Residential).
 3. Lighting Equipment:
 - a. Exterior Lighting.
 - b. Fluorescent Ballasts.
 - c. Fluorescent Luminaires.
 - d. Industrial Lighting (High/Low Bay).
 - e. Suspended Luminaires.
 4. Other Equipment:
 - a. Pre-Rinse Spray Valves.
- H. Electronic products and equipment being installed which fall into a category covered by EPEAT program must be EPEAT registered.
1. Electronic products and equipment covered by EPEAT program as of 05/19/2015 include:
 - a. Computers: Desktops, Workstations, and Thin Clients.
 - b. Computers: Notebooks and Integrated Computers.
 - c. Displays.
 - d. Imaging Equipment.
 - e. Televisions.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Irrigation professionals must be certified under a WaterSense labeled certification program.
- B. Construction Indoor Air Quality Management:
 - 1. During construction, meet or exceed recommended control measures of ANSI/SMACNA 008-2008, Chapter 3.
 - 2. Protect stored on-site and installed absorptive materials from moisture damage.
 - 3. If permanently installed air handlers are used during construction, filtration media with a minimum efficiency reporting value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda). Replace all filtration media immediately prior to occupancy.
 - 4. Perform building flush-out as follows:
 - a. After construction ends, prior to occupancy and with interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and a relative humidity no higher than 60 percent. OR
 - b. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it must be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or design minimum outside air rate determined in Prerequisite EQ 1, whichever is greater. During each day of flush-out period, ventilation must begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14000 cu. ft./sq. ft. of outside air has been delivered to the space.
 - 5. Provide construction dust control to comply with SCAQMD Rule 403.

3.2 ATTACHMENTS - NA

-----END-----

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

- A. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- E. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- F. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- G. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.
- H. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

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

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

- H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

1.4 UTILITY SERVICES:

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 24 inches square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- B. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 5 feet below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than feet, or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- C. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the 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.

3.2 CLEAN-UP:

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 42 00
CUTTING, REMOVAL, DEMOLITION, RESTORATION AND PATCHING

11/2015

PART 1 GENERAL

1.1 SCOPE:

- A. Refer to SECTION 01 00 00 for special requirements, protection, constraints, timing of work, scheduling of work, enclosures and similar requirements relating to this section.
- B. This section covers cutting, demolition, removal work, patching, leveling and restoration work as necessary to accomplish and complete all work under this contract, including any relocation or reuse of existing materials, equipment, systems, or other work, as well as the disposition of salvaged materials or debris. This Section applies to all work under this contract, including general construction, mechanical and electrical work.
- C. Contractor and his subcontractors shall examine the spaces/work site themselves to determine the actual conditions and requirements. All removals, demolition, cutting, restoration, new installations and other work shall be accomplished to transform the existing spaces and conditions to the new conditions required under the Contract, as well as to accomplish all tie-in work of new to existing.
- D. It is the intent that, unless specifically shown on the schedules, or is inherent in the work to be accomplished under the general construction work of the area, that each contractor shall perform the demolition, cutting, removals, relocations, patching and leveling, and restoration as will be required to accomplish the work under their contracts. All work indicated on the schedules shall be accomplished by the General Contractor.
- E. Except for general demolition of entire areas, it is the intent that at each area or space the contractor and each subcontractor shall make removals, perform cutting or demolition and accomplish relocations of work normal to his trade (i.e., Mechanical Contractor removes or relocates piping, ductwork and similar. At areas of general demolition of entire area spaces, the Mechanical Contractor shall make removals normal to their trade or may be called for, for reuse or relocation, make any relocations and cutoffs, terminate, or otherwise discontinue services that will be abandoned, shall be removed to the nearest active main. The general contractor shall then demolish or remove all unwanted electrical or mechanical materials, items or elements in the area.
- F. Contractor is required to restore all finishes, surfaces, items, & materials as required to accommodate new finishes. For

example, if wall paper, vinyl wall covering, ceramic wall tile, etc. is existing on wall, and new wall finish calls for wall to be painted, contractor is required to remove existing wall paper, vinyl wall covering, ceramic wall tile, etc. to accommodate new painted finish. These surfaces are required to be verified prior to bid, as no change to contract will be provided after award if existing finishes are clearly present.

PART 2: MATERIALS

2.1 SALVAGEABLE MATERIALS TO BE STORED BY OWNER (VA):

- A. The owner shall mark or tag existing materials, equipment or other items that are to be retained during a pre-demolition walk through. Salvageable materials and items designated or marked to remain the property of the government shall be carefully removed by applicable trades, protected from damage and stored adjacent to the removal area as directed.
- B. Consult the Project Manager concerning any possible salvageable items prior to demolition thereof. Carefully remove and salvage any materials designated to be retained.
- C. Any materials not wanted by the government shall be removed from the site by the contractor, without additional cost to the government.
- D. Removal from the area and the site to the government's storage area shall be by the contractor.

PART 3 EXECUTION:

3.1 TEMPORARY PROTECTION:

- A. Provide temporary bracing, shoring, needling and support during demolition, cutting, remodeling and related new construction necessary for the execution of the work and the protection of persons and property. Perform all work with appropriate supports, protection and methods to prevent collapse, settling or damage to property or persons. Provide adequate supports for the loads to be carried, with loads properly distributed, and including to lower levels and sound bearing, if necessary.
- B. Provide protective covering and enclosures necessary to prevent damage to existing spaces and materials to remain.
- C. Provide dust proof temporary enclosures (including above ceilings) separating areas under demolition and remodeling from the remainder of the buildings as well as temporary filters at ductwork. If work produces fumes or odors that impact patient care or staff operations, granulated active carbon filters shall be provided for all HVAC intake units where operations provide these odors or fumes. Provide temporary hinged doors in

temporary enclosures where necessary. Temporary and permanent doors shall be completely sealed with tape or other suitable material during demolition work and shall remain sealed until dust has settled.

3.2 MECHANICAL AND ELECTRICAL WORK EXPOSED

- A. Where unknown mechanical piping, ductwork or electrical conduit is exposed during removal of partitions, walls, floors and ceilings, the removal or re-routing shall be by the Mechanical or Electrical Contractor as applicable. The contractor is to provide at minimum labor and materials required for one journeyman electrician or plumber 40-manhours to relocate these utilities. Re-routed piping shall be located where directed and shall be re-connected to maintain all functions in proper operation. Abandoned piping may be left in place where it is disconnected from its source and capped or as directed by Project Manager. There shall be no "dead end" water, sewer, medical gas, or vent piping existing in the completed work.
- B. Removals, capping or otherwise terminating services which are abandoned or need to be abandoned, shall be accomplished without additional cost to the government, whether shown or noted on drawings or otherwise encountered.
- C. Contractor is to remove all old abandoned oval pneumatic tube lines, transfer boxes, and related equipment and components exposed within the construction area. The contractor is to provide at minimum labor and materials required for one electrician or laborer 40-manhours for removal.

3.3 WORK OF EACH CONTRACT

- A. The contractor and each subcontractor shall carefully review the contract documents, including those primarily for other trades, with respect to the coordination of demolition, removal and remodeling work and perform such removals normal to their respective trade as may be shown, noted, or otherwise required. Cutting and patching incidental to demolition, removal and/or remodeling of general construction work shall be construed as the work of the general contractor when shown or indicated on the general construction drawings or schedules or specifically noted or called for on documents primarily for other trades as being accomplished by the general contractor. Other contractors shall perform such other cutting, demolition, patching, replacement and restoration as may be required to accomplish their part of the work.

3.4 PAINTING

- A. Any painting to match adjacent or surrounding areas.

3.5 LEVELING OF FLOORS

- A. Contractor shall submit for approval - brand of latex, floor leveler to be used. Leveler shall include additive for waterproofing.

3.6 PATCHING

- A. Contractor shall be responsible for all patching required as a result of installation of new work.
- B. Contractor shall furnish all related components, trims, etc. required to complete the work.

- - -END- - -

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.2 RELATED WORK:

- A. Sustainable design requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.
- C. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.
- D. Cement board sheathing: Section 06 16 63, CEMENTITIOUS SHEATHING.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.
 - 2. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
 - 3. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

- 4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

E. Manufacturer's certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 152 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.5 QUALITY ASSURANCE:

- A. Installer: A firm with a minimum of three (3) years' experience in the type of work required by this section.

1.6 GRADING AND MARKINGS:

- A. Any unmarked lumber or plywood panel for its grade and species will not be allowed on VA Construction sites for lumber and material not normally grade marked, provide manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material meet the specified the specified requirements.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
 - NDS-15.....National Design Specification for Wood Construction
 - WCD1-01.....Details for Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
 - A190.1-07.....Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12(R2013).....Square and Hex Bolts and Screws
 - B18.2.2-10.....Square and Hex Nuts
 - B18.6.1-81(R2008).....Wood Screws

E. American Plywood Association (APA):

E30-11.....Engineered Wood Construction Guide

F. ASTM International (ASTM):

A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-
Iron Alloy Coated (Galvannealed) by the Hot Dip
Process

C954-11.....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

C1002-14.....Steel Self-Piercing Tapping Screws for the
Application of Gypsum Panel Products or Metal
Plaster Bases to Wood Studs or Metal Studs

D198-14.....Test Methods of Static Tests of Lumber in
Structural Sizes

D2344/D2344M-13.....Test Method for Short-Beam Strength of Polymer
Matrix Composite Materials and Their Laminates

D2559-12a.....Adhesives for Structural Laminated Wood
Products for Use Under Exterior (Wet Use)
Exposure Conditions

D3498-03 (R2011).....Adhesives for Field-Gluing Plywood to Lumber
Framing for Floor Systems

D6108-13.....Test Method for Compressive Properties of
Plastic Lumber and Shapes

D6109-13.....Test Methods for Flexural Properties of
Unreinforced and Reinforced Plastic Lumber and
Related Products

D6111-13a.....Test Method for Bulk Density and Specific
Gravity of Plastic Lumber and Shapes by
Displacement

D6112-13.....Test Methods for Compressive and Flexural Creep
and Creep-Rupture of Plastic Lumber and Shapes

F844-07a (R2013).....Washers, Steel, Plain (Flat) Unhardened for
General Use

F1667-13.....Nails, Spikes, and Staples

G. American Wood Protection Association (AWPA):

AWPA Book of Standards

H. Commercial Item Description (CID):

- A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self
Threading Anchors)
- I. Forest Stewardship Council (FSC):
FSC-STD-01-001(Ver. 4-0)FSC Principles and Criteria for Forest
Stewardship
- J. Military Specification (Mil. Spec.):
MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated
- K. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products
- L. Truss Plate Institute (TPI):
TPI-85.....Metal Plate Connected Wood Trusses
- M. U.S. Department of Commerce Product Standard (PS)
PS 1-95.....Construction and Industrial Plywood
PS 20-10.....American Softwood Lumber Standard
- N. ICC Evaluation Service (ICC ES):
AC09.....Quality Control of Wood Shakes and Shingles
AC174.....Deck Board Span Ratings and Guardrail Systems
(Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

- A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
 - 1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.
- C. Lumber Other Than Structural:
 - 1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.

2. Framing lumber: Minimum extreme fiber stress in bending of 7584 kPa (1100 PSI).
3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.

D. Sizes:

1. Conforming to PS 20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
 - a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
 - b. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Comply with Mil Spec. MIL-L-19140.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

2.3 PLYWOOD:

- A. Comply with PS 1.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Sheathing:
 - 1. APA rated Exposure 1 or Exterior; panel grade CD or better.
 - 2. Wall sheathing:
 - a. Minimum 9 mm (11/32 inch) thick with supports 406 mm (16 inches) on center and 12 mm (15/32 inch) thick with supports 610 mm (24 inches) on center unless specified otherwise.
 - b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.
 - 3. Roof sheathing:
 - a. Minimum 9 mm (11/32 inch) thick with span rating 24/0 or 12 mm (15/32 inch) thick with span rating for supports 406 mm (16 inches) on center unless specified otherwise.
 - b. Minimum 15 mm (19/32 inch) thick or span rating of 40/20 or 18 mm (23/32 inch) thick or span rating of 48/24 for supports 610 mm (24 inches) on center.
- D. Subflooring:
 - 1. Under finish wood flooring or underlayment:
 - a. APA Rated sheathing, Exposure 1. panel grade CD.
 - b. Minimum 15 mm (19/32 inch) thick with span rating 32/16 or greater for supports at 406 mm (16 inches) on center and 18.25 mm (23/32 inch) thick with span rating 48/24 for supports at 610 mm (24 inches) on center.
 - 2. Combination subflooring-underlayment under resilient flooring or carpet:
 - a. APA Rated Stud-I-Floor Exterior or Exposure 1, T and G.
 - b. Minimum 15 mm (19/32 inch) thick or greater, span rating 16, for supports at 406 mm (16 inches) on center; 18 mm (23/32 inch) thick or greater, span rating 24, for supports at 610 mm (24 inches) on center.
 - c. Minimum 19 mm (3/4-inch) thick or greater, span rating 32, for supports at 812 mm (32 inches) on center; 28 mm (1-1/8 inch)

thick, span rating 48 for supports at 1219 mm (48 inches) on center.

E. Underlayment:

1. APA rated Exposure 1 or Exterior, panel grade C-C Plugged.
2. Minimum 6 mm (1/4 inch) thick or greater over plywood subflooring unless otherwise shown.

2.4 STRUCTURAL-USE PANELS:

A. Comply with APA E30.

B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.

C. Wall and Roof Sheathing:

1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 406 mm (16 inches) on center and 24/0 or greater for supports 610 mm (24 inches) on center.

D. Subflooring:

1. Under finish wood flooring or underlayment:
 - a. APA rated sheathing panels, durability classification of Exposure 1 or Exterior.
 - b. Span Rating of 24/16 or greater for supports 406 mm (16 inches).
2. Under resilient floor or carpet.
 - a. APA rated combination subfloor-underlayment grade panels, durability classification of Exposure 1 or Exterior T and G.
 - b. Span Rating of 16 or greater for supports 406 mm (16 inches) on center and 24 or greater for supports 610 mm (24 inches) on center.

E. Underlayment:

1. APA rated Exposure 1.
2. Minimum 6 mm (1/4 inch) thick or greater over subfloor.

F. Wood "I" Beam Members:

1. Size and Shape as indicated in contract documents.
2. Cambered and marked "TOP UP".
3. Plywood webs: PS-1, minimum 9 mm (3/8 inch) thick, unless shown otherwise.
4. Flanges: Kiln dried stress rated dense lumber minimum 38 mm (1-1/2 inch) thick, width as indicated on contract documents.

5. Plywood web fitted into flanges and joined with ASTM D2559 adhesive to form "I" beam section unless shown otherwise.

G. Laminated Veneer Lumber (LVL):

1. Bonded jointed wood veneers with ASTM D2559 adhesive.
2. Scarf jointed wood veneers with grain of wood parallel.
3. Size as indicated on contract documents.

2.5 ROUGH HARDWARE AND ADHESIVES:

A. Anchor Bolts:

1. ASME B18.2.1 and ASME B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
2. Extend at least 203 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Provide 13 mm (1/2 inch) bolt unless shown otherwise.

C. Washers

1. ASTM F844.
2. Provide zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:

1. Wood to Wood: ASME B18.6.1 or ASTM C1002.
2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
2. ASTM F1667:
 - a. Common: Type I, Style 10.
 - b. Concrete: Type I, Style 11.
 - c. Barbed: Type I, Style 26.
 - d. Underlayment: Type I, Style 25.
 - e. Masonry: Type I, Style 27.
 - f. Provide special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

F. Framing and Timber Connectors:

1. Fabricate of ASTM A653/A653M, Grade A; steel sheet not less than 1.3 mm (0.052 inch) thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.
2. Framing Angles: Angle designed with bendable legs to provide three (3) way anchors.
3. Straps:
 - a. Designed to provide wind and seismic ties with sizes as shown or specified.
 - b. Strap ties not less than 32 mm (1-1/4 inches) wide.
 - c. Punched for fastener.
4. Metal Bridging:
 - a. V shape deformed strap with not less than two (2) nail holes at ends, designed to nail to top and side of framing member and bottom and side of opposite member.
 - b. Not less than 19 by 127 mm (3/4 by 5 inches) bendable nailing flange on ends.
 - c. Fabricated of 1 mm (0.04 inch) minimum thick sheet.
5. Joist Hangers:
 - a. Fabricated of 1.6 mm (0.063 inch) minimum thick sheet, U design unless shown otherwise.
 - b. Heavy duty hangers fabricated of minimum 2.7 mm (0.108 inch) thick sheet, U design with bent top flange to lap over beam.
6. Timber Connectors: Fabricated of steel to shapes indicated on contract drawings.
7. Joist Ties: Mild steel flats, 5 mm by 32 mm (3/16 inch by 1-1/4 inch) size with ends bent about 30 degrees from horizontal, and extending at least 406 mm (16 inches) onto framing. Punch each end for three (3) spikes.
8. Wall Anchors for Joists and Rafters:
 - a. Mild steel strap, 5 mm by 32 mm (3/16 inch by 1-1/4 inch) with wall ends bent 50 mm (2 inches), or provide 9 mm by 130 mm (3/8 inch by 5 inch) pin through strap end built into masonry.
 - b. Strap long enough to extend onto three joists or rafters, and punched for spiking at each bearing.
 - c. Strap not less than 101 mm (4 inches) embedded end.
9. Joint Plates:
 - a. Steel plate punched for nails.

- b. Steel plates formed with teeth or prongs for mechanically clamping plates to wood.
 - c. Size for axial eccentricity, and fastener loads.
- G. Adhesives:
- 1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
 - 2. For structural laminated Wood: ASTM D2559.
 - 3. Adhesives to have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

- A. Conform to applicable requirements of the following:
- 1. AFPA NDS for timber connectors.
 - 2. AITC A190.1 Timber Construction Manual for heavy timber construction.
 - 3. AFPA WCD1 for nailing and framing unless specified otherwise.
 - 4. APA for installation of plywood or structural use panels.
 - 5. TPI for metal plate connected wood trusses.
- B. Fasteners:
- 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use special nails with framing connectors.
 - c. For sheathing and subflooring, select length of nails sufficient to extend 25 mm (1 inch) into supports.
 - d. Use 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
 - e. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.
 - f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
 - g. Nailing Schedule; Using Common Nails:
 - 1) Joist bearing on sill or girder, toe nail three (3) 8d nails or framing anchor.
 - 2) Bridging to joist, toe nail each end two (2) 8d nails.

- 3) Ledger strip to beam or girder three (3) 16d nails under each joint.
- 4) Subflooring or Sheathing:
 - a) 152 mm (6 inch) wide or less to each joist face nail two (2) 8d nails.
 - b) Subflooring, more than 152 mm (6 inches) wide, to each stud or joint, face nail three (3) 8d nails.
 - c) Plywood or structural use panel to each stud or joist face nail 8d, at supported edges 152 mm (6 inches) on center and at intermediate supports 254 mm (10 inches) on center. When gluing plywood to joint framing increase nail spacing to 305 mm (12 inches) at supported edges and 508 mm (20 inches) o.c. at intermediate supports.
- 5) Sole plate to joist or blocking, through sub floor face nail 20d nails, 406 mm (16 inches) on center.
- 6) Top plate to stud, end nail two (2) 16d nails.
- 7) Stud to sole plate, toe nail or framing anchor. Four (4) 8d nails.
- 8) Doubled studs, face nail 16d at 610 mm (24 inches) on center.
- 9) Built-up corner studs 16d at 610 mm (24 inches) (24 inches) on center.
- 10) Doubled top plates, face nails 16d at 406 mm (16 inches) on center.
- 11) Top plates, laps, and intersections, face nail two (2) 16d.
- 12) Continuous header, two pieces 16d at 406 mm (16 inches) on center along each edge.
- 13) Ceiling joists to plate, toenail three (3) 8d or framing anchor.
- 14) Continuous header to stud, four (4) 16d.
- 15) Ceiling joists, laps over partitions, face nail three (3) 16d or framing anchor.
- 16) Ceiling joists, to parallel rafters, face nail three (3) 16d.
- 17) Rafter to plate, toe nail three (3) 8d or framing anchor.
Brace 25 mm (1 inch) thick board to each stud and plate, face nail three (3) 8d.
- 18) Built-up girders and beams 20d at 812 mm (32 inches) on center along each edge.

2. Bolts:

- a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Provide toggle bolts to hollow masonry or sheet metal.
 - e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
 - a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
 4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
 5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
 6. Screws to Join Wood:
 - a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
 7. Installation of Timber Connectors:
 - a. Conform to applicable requirements of the AFPA NDS.
 - b. Fit wood to connectors and drill holes for fasteners so wood is not split.
- C. Set sills or plates level in full bed of mortar on masonry or concrete walls.
1. Space anchor bolts 1219 mm (4 feet) on centers between ends and within 152 mm (6 inches) of end. Stagger bolts from side to side on plates over 178 mm (7 inches) in width.
 2. Provide shims of slate, tile or similar approved material to level wood members resting on concrete or masonry. Do not use wood shims or wedges.
 3. Closely fit, and set to required lines.

- D. Cut notch, or bore in accordance with AFPA WCD1 passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.
- E. Blocking Nailers, and Furring:
 - 1. Install furring, blocking, nailers, and grounds where shown.
 - 2. Provide longest lengths practicable.
 - 3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
 - 4. Layers of Blocking or Plates:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 610 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.
- F. Framing:
 - 1. Set with crown edge up.
 - 2. Keep framing at least 50 mm (2 inches) away from chimneys.
 - 3. Bear on not less than 101 mm (4 inches) on concrete and masonry, and 38 mm (1-1/2 inches) on wood and metal unless shown otherwise.
 - 4. Support joist, trimmer joists, headers, and beams framing into carrying members at same relative levels on joist hangers unless shown otherwise.
 - 5. Lap and spike wood joists together at bearing, or butt end-to-end with scab ties at joint and spike to plates. Scab tie lengths not less than 203 mm (8 inches) lap on joist ends. Install wood I beam joists as indicated in contract documents.
 - 6. Frame openings with headers and trimmer joist. Double headers carrying more than two tail joists and trimmer joists supporting headers carrying more than one tail joist unless otherwise indicated in contract documents.
 - 7. Drive nails through headers into joists using two (2) nails for 50 mm by 152 mm (2 inch by 6 inch); three (3) nails for 50 mm by 203 mm (2 inch by 8 inch) and four (4) nails for 50 mm by 254 mm (2 inch by 10 inch) and over in size.
 - 8. Install nearest joist to double headers and spike joist to both header members before trimmer joist is installed and secured together.
 - 9. Doubled joists under partitions parallel with floor joists.

10. Where joists run perpendicular to masonry or concrete, anchor every third joist to masonry or concrete with one (1) metal wall anchor. Securely spike anchors with three (3) nails to side of joist near its bottom.
 11. Anchor joists running parallel with masonry or concrete walls to walls with steel flats spaced not over 1828 mm (6 feet) apart. Extend steel flats over at least three (3) joists and into masonry 101 mm (4 inches) with ends turned 50 mm (2 inches); bolt to concrete. Set top of flats flush with top of joists, and securely nail steel flats to each joist.
 12. Hook ties at steel framing over top flange of steel members.
 13. Nonbearing partitions running parallel with ceiling joists, install solid 50 mm (2 inch) thick bridging same depth as ceiling joists cut to fit snug between joists for securing top plate of partitions. Securely spike bridging to joists. Space 1219 mm (4 feet) on center.
- G. Bridging:
1. Provide 25 mm by 75 mm (1 inch by 3 inch) lumber with ends beveled for slope. Option: Metal bridging may be provided in lieu of wood bridging.
 2. Install one (1) row of bridging for joist spans over 2438 mm (8 feet), but less than 4877 mm (16 feet) long; install two (2) rows for spans over 4877 mm (16 feet) long.
 3. Install an extra row of bridging between trimmer and next two (2) joists if header is more than 610 mm (2 feet) from end of trimmer or from regular row of bridging.
 4. Secure with two (2) nails at ends.
 5. Leave bottom ends loose until after subflooring or roof sheathing is installed.
 6. Install single row of bridging at centerline of span and two (2) rows at the third points of span unless otherwise shown.
- H. Roof Framing:
1. Set rafters with crown edge up.
 2. Form a true plane at tops of rafters.
 3. Valley, Ridge, and Hip Members:
 - a. Size for depth of cut on rafters.
 - b. Straight and true intersections of roof planes.
 - c. Secure hip and valley rafters to wall plates by using framing connectors.

- d. Double valley rafters longer than the available lumber, with pieces lapped not less than 1219 mm (4 feet) and spiked together.
 - e. Butt joint and scab hip rafters longer than the available lumber.
 - 4. Spike to wall plate and to ceiling joists except when secured with framing connectors.
 - 5. Frame openings in roof with headers and trimmer rafters. Double headers carrying more than one (1) rafter unless shown otherwise.
 - 6. Install 50 mm by 101 mm (2 inch by 4 inch) strut between roof rafters and ceiling joists at 1219 mm (4 feet) on center unless shown otherwise.
- I. Framing of Dormers:
- 1. Frame as indicated in contract documents, with top edge of ridge beveled to pitch of roof header.
 - 2. Set studs on doubled trimmer rafters.
 - 3. Double studs at corners of dormers.
 - 4. Double plate on studs and notch rafters over plate and bear at least 75 mm (3 inches) on plates.
 - 5. Frame opening to receive window frame or louver frame.
- J. Partition and Wall Framing:
- 1. Provide 50 mm by 101 mm (2 inch by 4 inch) studs spaced 406 mm (16 inches) on centers; unless otherwise indicated on contract documents.
 - 2. Install double studs at openings and triple studs at corners.
 - 3. Installation of sole plate:
 - a. Anchor plates of walls or partitions resting on concrete floors in place with expansion bolts, one (1) near ends of piece and at intermediate intervals of not more than 1219 mm (4 feet) or with power actuated drive pins with threaded ends of suitable type and size, spaced 610 mm (2 feet) on center unless shown otherwise.
 - b. Nail plates to wood framing through subfloor as specified in nailing schedule.
 - 4. Headers or Lintels:
 - a. Make headers for openings of two (2) pieces of 50 mm (2 inch) thick lumber of size shown with plywood filler to finish flush with face of studs or solid lumber of equivalent size.
 - b. Support ends of headers on top of stud cut for height of opening. Spike cut stud to adjacent stud. Spike adjacent stud to header.

5. Provide double top plates, with members lapped at least 610 mm (2-foot) spiked together.
6. Install intermediate cut studs over headers and under sills to maintain uniformity of stud spacing.
7. Provide single sill plates at bottom of opening unless otherwise indicated in contract documents. Toe nail to end stud, face nail to intermediate studs.
8. Install 50 mm (2 inch) blocking for firestopping so that maximum dimension of any concealed space is not over 2438 mm (8 feet) in accordance with AFPA WCD1.
9. Install corner bracing when plywood or structured use panel sheathing is not used.
 - a. Let corner bracing into exterior surfaces of studs at an angle of approximately 45 degrees, extended completely over walls plates, and secured at bearing with two (2) nails.
 - b. Provide 25 mm by 101 mm (1 inch by 4 inch) corner bracing.

K. Rough Bucks:

1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.
2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.
3. Cut rough bucks from 50 mm (2 inch) thick stock, of same width as partitions in which they occur and of width shown in exterior walls.
4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.

L. Subflooring:

1. Subflooring may be either boards, structural-use panels, or plywood.
2. Lay board subflooring diagonally, with close joints. Stagger end joints and make joints over supports. Bear each board on at least three supports.
3. Provide a clearance of approximately 13 mm (1/2 inch) at masonry or concrete at walls.
4. Apply plywood and structural-use panel subflooring with face grain or long dimension at right angles to the supports, with edges 6 mm (1/4 inch) apart at side joints, and 3 mm (1/8 inch) apart at end joints.
5. Combination subfloor-underlayment:
 - a. Space edges 3 mm (1/8 inch) apart.

- b. Provide a clearance of 6 mm (1/4 inch) at masonry on concrete at walls.
 6. Stagger panel end joints and make over support.
- M. Underlayment:
1. Where finish flooring of different thickness is used in adjoining areas, provide underlayment of thickness required to bring finish-flooring surfaces into same plane.
 2. Apply to dry, level, securely nailed, clean, wood subfloor without any projections.
 3. Plywood and particle underlayment are to be glue-nailed to subfloor.
 4. Butt underlayment panels to a light contact with a 1 mm (1/32 inch) space between plywood or hardboard underlayment panels and walls, and approximately 9 mm (3/8 inch) between particleboard underlayment panels and walls.
 5. Stagger underlayment panel end joints with respect to each other and offset joints with respect to joints in the subfloor at least 50 mm (2 inches).
 6. After installation, avoid traffic on underlayment and damage to the finish surface.
- N. Sheathing:
1. Provide plywood or structural-use panels for sheathing.
 2. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
 3. Set nails not less than 9 mm (3/8 inch) from edges.
 4. Install 50 mm by 101 mm (2 inch by 4 inch) blocking spiked between joists, rafters and studs to support edge or end joints of panels.

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SECTION 07 01 50.19
PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Partial roof removal for new roof system installation.
 2. Roofing membrane and selective roofing system component removal for new roof membrane installation.
 3. Existing roofing membrane preparation for new roofing membrane system installation.
- B. Existing Roofing System: Built-up asphalt and EPDM. System components include:
1. Aggregate ballast.
 2. Roof insulation and drainage board.
 3. Aggregate surfacing.
 4. Roofing membrane.
 5. Cover board.
 6. Roof insulation.
 7. Vapor retarder.
 8. Substrate board.

1.2 RELATED REQUIREMENTS

- A. Replacement Roof Deck and Parapet Sheathing: Section 06 10 00, ROUGH CARPENTRY.
- B. New Roofing System: Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING
- C. Sheet Metal Counterflashing: Section 07 60 00, SHEET METAL FLASHING AND TRIM.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
1. FX-1-01(R2006) Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
- C. American Society for Nondestructive Testing (ASNT):
1. SNT-TC-1A - Personnel Qualification and Certification for Nondestructive Testing.
- D. ASTM International (ASTM):

1. C208-12 - Cellulosic Fiber Insulating Board.
 2. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
 3. C728-15 - Perlite Thermal Insulation Board.
 4. C1177/C1177M-13 - Glass Mat Gypsum Substrate for Use as Sheathing.
 5. C1153-97(2003)e1 - Location of Wet Insulation in Roofing Systems Using Infrared Imaging.
 6. C1278/C1278M-07a(2015) - Fiber-Reinforced Gypsum Panel.
 7. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
- E. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
1. DOC PS 1-09 - Structural Plywood.
 2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting minimum 30 days before beginning Work of this section.
1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Architect/Engineer.
 - c. Contractor.
 - d. Installer.
 - e. Manufacturer's field representative.
 - f. Other installers responsible for adjacent and intersecting work, including mechanical and electrical equipment installers.
 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Removal and installation schedule.
 - b. Removal and installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Removal and installation.
 - f. Temporary roofing including daily terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.

3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 1. Show size, configuration, and installation details.
- C. Manufacturer's Literature and Data:
 1. Description of each product.
 2. Description of temporary roof system and components.
 3. List of patching materials.
 4. Recover board fastening requirements.
 5. Temporary roofing installation instructions and removal instructions. Preparation instructions to receive new roofing.
- D. Photographs: Document existing conditions potentially affected by roofing operations before work begins.
- E. Field Inspection Reports:
 1. Certify warrantor inspected completed roofing and existing warranty remains in effect.
- F. Infrared Roof Moisture Survey Report.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Same installer as Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.
 2. Licensed to perform asbestos abatement in Project jurisdiction when removal of asbestos-containing material is required.
 3. Approved by existing roofing system warrantor when work affects existing roofing system under warranty.

1.7 FIELD CONDITIONS

- A. Building Occupancy: Perform work to minimize disruption to normal building operations.
 1. Verify occupants are evacuated from affected building areas when working on structurally impaired roof decking above occupied areas.
 2. Provide notice minimum 72 hours before beginning activities affecting normal building operations.
- B. Existing Roofing Available Information:
 1. The following are available for Contractor reference:

- a. Roof moisture survey.
 - b. Test cores analysis.
 - c. Construction drawings and project manual.
2. Examine available information before beginning work of this section.
- C. Weather Limitations: Proceed with reroofing preparation only during dry weather conditions as specified for new roofing installation in Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.
1. Remove only as much roofing in one day as can be made watertight in same day.
- D. Hazardous materials are not expected in existing roofing system.
1. Known hazardous materials were removed before start of work.
 2. Do not disturb suspected hazardous materials. When discovered, notify Contracting Officer's Representative.
 3. Hazardous materials discovered during execution of the work will be removed by Government as work of a separate contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Patching Materials: Match existing roofing system materials.
- B. Plywood Sheathing: See Section 06 10 00, ROUGH CARPENTRY.
- C. Metal Flashing: See Section 07 60 00, SHEET METAL FLASHING AND TRIM.
- D. Temporary Protection Materials:
 1. Expanded Polystyrene (EPS) Insulation: ASTM C578.
 2. Plywood: NIST DOC PS 1, Grade CD Exposure 1.
 3. Oriented Strand Board (OSB): NIST DOC PS 2, Exposure 1.
- E. Temporary Roofing System Materials: Contractor's option.
- F. Recover Board: One of the following:
 1. Insulation: See Section 07 22 00, ROOF AND DECK INSULATION.
- G. Fasteners: Type and size required by roof membrane manufacturer to resist wind uplift.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Infrared Roof Moisture Survey: Ground-based, walk-over type performed according to ASTM C1153.
 1. Record the entire survey on DVD and provide one copy to Contracting Officer's Representative with report.

2. Include in report thermograms of suspect areas and corresponding daytime photos of same locations.
3. Conduct inspection by NDT test technician certified to at least Level 2 in Thermal/Infrared test method according to ASNT SNT-TC-1A.
4. Mark out roof areas determined to be wet to indicate areas to be removed.

3.2 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing roofing system indicated to remain.
 1. Cover roof membrane with temporary protection materials without impeding drainage.
 2. Limit traffic and material storage to protected areas.
 3. Maintain temporary protection until replacement roofing is completed.
- C. Protect existing construction and completed work from damage.
- D. Protect landscaping from damage.
- E. Maintain access to existing walkways and adjacent occupied facilities.
- F. Coordinate use of rooftop fresh air intakes with Contracting Officer's Representative to minimize effect on indoor air quality.
- G. Ensure temporary protection materials are available for immediate use in case of unexpected rain.
- H. Ensure roof drainage remains functional.
 1. Keep drainage systems clear of debris.
 2. Prevent water from entering building and existing roofing system.
- I. Coordinate rooftop utilities remaining active during roofing work with Contracting Officer's Representative.

3.3 RE-ROOFING PREPARATION - GENERAL

- A. Notify Contracting Officer's Representative of planned operations, daily.
 1. Identify location and extent of roofing removal.
 2. Request authorization to proceed.

3.4 OVERBURDEN REMOVAL

- A. Remove aggregate ballast.
- B. Remove loose aggregate from bituminous membrane surface.

3.5 COMPLETE ROOFING SYSTEM REMOVAL

- A. Remove existing roofing system completely, exposing structural roof deck.
 - 1. Remove cover board, roof insulation, vapor retarder, and substrate board.
 - 2. Remove or cut-off roofing system fasteners.

3.6 PARTIAL ROOFING SYSTEM REMOVAL

- A. Remove existing roofing completely, exposing structural roof deck at locations and to extent indicated on drawings.
 - 1. Remove cover board, roof insulation, vapor retarder, and substrate board.
 - 2. Remove or cut-off roofing system fasteners.

3.7 ROOFING MEMBRANE AND SELECTIVE ROOFING SYSTEM COMPONENT REMOVAL

- A. Remove existing roofing membrane, only, in locations and to extent indicated on drawings.
- B. Visually inspect cover board, roof insulation, vapor retarder, and substrate board for moisture immediately after roof membrane removal.
 - 1. Coordinate with Contracting Officer's Representative to observe inspections.
 - 2. Identify wet roofing system components required to be removed.
 - 3. Mark roofing system removal locations and extents.
- C. Remove wet roofing system components.
 - 1. Remove or cut-off roofing system fasteners when removals expose structural roof deck.
- D. Patch selective roofing system removals immediately after inspection and repair.
- E. Install patching materials to match existing roofing system.
- F. Patch roofing membrane to maintain building watertight, unless new roofing membrane is installed same day as removal and repair.

3.8 DECK PREPARATION

- A. Inspect structural roof deck after roofing system removal.
- B. Concrete Roof Decks:
 - 1. Visually confirm concrete roof deck is dry.
 - 2. Perform moisture test according to ASTM D4263 each day for each separate roof area.
 - a. Proceed with roofing work only when moisture is not observed.

3. Secure roof deck with additional fastenings as indicated on drawings. Determined by Contracting Officer's Representative.
4. Replace roof deck as indicated on drawings.
 - a. Replacement Roof Deck: See Section 06 10 00, ROUGH CARPENTRY.

3.9 TEMPORARY ROOFING

- A. Install temporary roofing to maintain building watertight.
- B. Prepare temporary roofing to receive new roofing.

3.10 EXISTING MEMBRANE PREPARATION FOR NEW ROOFING

- A. Remove existing roofing surface projections and irregularities. Produce smooth surface to receive recover boards.
 1. Broom clean existing surface.

3.11 BASE FLASHING REMOVAL

- A. Expose base flashings to permit removal.
 1. Two-Piece Counterflashings: Remove cap flashing and store for reuse.
 2. Single Piece Counterflashings: Carefully bend counterflashing.
 3. Metal Copings: Remove decorative cap and store for reuse.
- B. Remove existing base flashings.
 1. Clean substrates to receive new flashings.
- C. Replace counterflashings damaged during removal.
 1. Counterflashings: See Section 07 60 00 SHEET METAL FLASHING AND TRIM.
- D. Remove existing parapet sheathing and inspect parapet framing.
 1. Notify Contracting Officer's Representative of damaged framing.
- E. Install plywood sheathing, 15 mm (19/32 inch) thick.

3.12 RECOVER BOARD INSTALLATION

- A. Fasten recover boards to resist wind-uplift.
 1. Fastening Requirements: See Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.
 2. Uplift Resistance: Base on pull out resistance determined by specified field testing.

3.13 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Fastener Pull Out Tests: ANSI/SPRI FX-1.
- B. Existing Roofing System Warrantor Services:
 1. Inspect reroofing preparation and roofing installation to verify compliance with existing warranty conditions.

2. Submit reports of field inspections, and supplemental instructions issued during inspections.

3.14 DISPOSAL

- A. Collect waste materials in containers.
- B. Remove waste materials from project site, regularly, to prevent accumulation.
- C. Legally dispose of waste materials.

- - E N D - -

SECTION 07 18 13
PEDESTRIAN TRAFFIC COATINGS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies a surface applied elastomeric and composition waterproofing type membrane suitable for light pedestrian traffic and recreation areas, but not intended for heavy industrial use.

1.2 RELATED WORK:

- A. Plywood underlayment: Section 06 10 00, ROUGH CARPENTRY.
- B. Metal flashing: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 TEST AREA:

- A. Before start of general application, apply the elastomeric coating as specified in a representative test area. Provide a test area not less than 9.29 square meters (100 square feet). The area to be covered by the coating to include all site conditions such as flashings bases, corners and projections through the coating. Provide test area in location determined by the Contracting Officer Representative (COR). After COR approval, area will serve as an example for the remaining work.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data: Each material, indicating compliance with specification requirements.
- C. Samples: Each finish color on 101 by 203 mm (4 by 8 inch) substrate, layered to show each coat and finish.
- D. Installer qualifications.
- E. Manufacturer warranty.

1.5 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their pedestrian traffic coating for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.6 DELIVERY AND STORAGE:

- A. Deliver materials to the site in original sealed containers, clearly marked with manufacturer's name and brand, and type of material.
- B. Store materials in weathertight and dry storage facility. Protect from damage from handling, weather and construction operations before, during and after installation. Store materials at temperatures and under conditions recommended by the manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS:

Do not proceed with application of materials when ambient temperature is less or greater than that recommended by the coating material manufacturer. Do not apply traffic coatings to damp or wet substrates, when relative humidity exceeds 85 percent, or when temperatures are less than 3 deg C (5 deg F) above dew point.

1.8 SAFETY REQUIREMENTS:

Keep products away from heat, sparks and flame. Do not permit use of spark-producing equipment during application of flammable products or where explosive fumes are present.

1.9 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Obtain products from single manufacturer or from sources recommended by manufacturer for use with pedestrian traffic coatings system and incorporated in manufacturer's warranty.
- B. Installer's Qualifications: Work to be performed by installer having three (3) years' experience for work relating to this section and approved in writing by traffic coating manufacturer.

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 basic designation only.
- B. ASTM International (ASTM):
 - C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants
 - D412-06a (R2013).....Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - D2240-05 (R2010).....Rubber Property - Durometer Hardness
 - E96/E96M-13.....Water Vapor Transmission of Materials

PART 2 - PRODUCTS

2.1 PRIMER:

- A. Type required by the elastomeric coating manufacturer.

2.2 ELASTOMERIC BASE AND TOP COAT:

A. Provide elastomeric base and topcoat materials to meet or exceed the following requirements:

| Property | Test Method | Base Coat | Top Coat |
|--|---------------|--|-----------------------------------|
| Tensile Strength | ASTM D412 | 2068 kPa (psi) | 4136 kPa (600 psi) |
| Elongation, percent (of original benchmark distance) | ASTM D412 | 550 | 200 |
| Hardness, Shore A | ASTM D2240 | 20 | 45 |
| Peel Strength (on concrete) | ASTM C794 | 13.6 kg (30 lb.), 100 percent cohesion | 100 percent cohesion to base coat |
| Permeability | ASTM E96/E96M | 12 metric perms | 0.06 metric perms |

2.3 AGGREGATE:

A. Thoroughly washed, clean, medium-grained sharp indigenous stone granules, graded between 1 mm (.04 inch) and 4 mm (.16 inch) in size, and having a hardness of 6.5 or greater on the Moh's scale.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

- A. Apply to clean, dry surfaces. Smooth rough spots and tool marks.
- B. Fill holes, depressions and cracks with fillers compatible with the coating material and recommended by the coating manufacturer.
- C. Subsurface imperfections that telegraph through the finish coating surface are not acceptable.

3.2 WORK COORDINATION:

A. To provide a watertight installation, coordinate this work with flashing and drains required to be installed before the coating work begins and be completed after the coating is in place.

3.3 APPLICATION:

- A. Prime surfaces to receive elastomeric waterproofing materials as recommended by the product manufacturer.
- B. Where horizontal surfaces intersect vertical surfaces, provide a sealant type fillet as recommended by the manufacturer.
- C. Apply elastomeric base coat at a rate that will ensure a dry film thickness of not less than 0.9 mm (35 mils).

- D. Uniformly disperse aggregate topping at the rate of 0.5 Kg per sq. m (10 lbs./100 sq. ft.); inter-bond and vulcanize granules within the fluid elastomeric topping in accordance with manufacturer's instructions.
- E. Apply elastomeric top coat at a rate which will ensure a dry film thickness of 0.4 mm (15 mils) for the top coat and a total combined dry film thickness for the base and top coats of not less than 1.3 mm (50 mils).
- F. Complete the base to a uniform established line as shown.

3.4 CLEANING:

- A. Remove smears of elastomeric material from other work.

3.5 PROTECTION:

- A. Protect the finished coating from traffic until the coating cures and afterward until final acceptance.

- - - E N D - - -

SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermal insulation.
 - a. Board or block insulation at foundation perimeter.
 - b. Batt or blanket insulation at exterior framed and furred walls.
 - c. Board or block insulation at floor assemblies above unconditioned spaces.
 - d. Board or block insulation at masonry cavity walls.
 - e. Loose fill insulation at exterior hollow masonry walls.
2. Acoustical insulation.
 - a. Semi-rigid insulation at interior framed partitions.
 - b. Batt and blanket insulation at interior framed partitions.
 - c. Board insulation at interior concrete and masonry partitions.

1.2 RELATED REQUIREMENTS

- A. Loose Fill Insulation for Attic Floors: Section 07 21 23, LOOSE-FILL INSULATION.
- B. Safing Insulation: Section 07 84 00, FIRESTOPPING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 1. C516-08(2013)e1 - Vermiculite Loose Fill Thermal Insulation.
 2. C549-06(2012) - Perlite Loose Fill Insulation.
 3. C552-15 - Cellular Glass Thermal Insulation.
 4. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 5. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
 6. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 7. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
 8. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 9. C728-15 - Perlite Thermal Insulation Board.

10. C954-15 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness.
11. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
12. D312/D312M-15 - Asphalt Used in Roofing.
13. E84-15a - Surface Burning Characteristics of Building Materials.
14. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 1. Show insulation type, thickness, and R-value for each location.
- C. Manufacturer's Literature and Data:
 1. Description of each product.
 2. Adhesive indicating manufacturer recommendation for each application.
- D. Sustainable Construction Submittals:
 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.

1.5 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.
- C. Protect foam plastic insulation from UV exposure.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

- A. Insulation Thickness:
 - 1. Provide thickness required by R-value shown on drawings.
 - 2. Provide thickness indicated when R-value is not shown on drawings.
- B. Insulation Types:
 - 1. Provide one insulation type for each application.
- C. Sustainable Construction Requirements:
 - 1. Insulation Recycled Content:
 - a. Polyisocyanurate/polyurethane rigid foam: 9 percent recovered material.
 - b. Polyisocyanurate/polyurethane foam-in-place: 5 percent recovered material.
 - c. Glass fiber reinforced: 6 percent recovered material.
 - d. Phenolic rigid foam: 5 percent recovered material.
 - e. Rock wool material: 75 percent recovered material.
 - 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-Flooring Adhesives and Sealants.

2.2 THERMAL INSULATION

- A. Perimeter Insulation In Contact with Soil:
 - 1. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX.
 - 2. Cellular Glass Block: ASTM C552, Type I or IV.
- B. Exterior Framing or Furring Insulation:
 - 1. Mineral Fiber: ASTM C665, Type II, Class C, Category I where concealed by thermal barrier.
 - 2. Mineral Fiber: ASTM C665, Type III, Class A at other locations.
- C. Inside Face of Exterior Wall Insulation:
 - 1. Mineral Fiber Board: ASTM C612, Type IB or II.
 - 2. Perlite Board: ASTM C728.
 - 3. Cellular Glass Block: ASTM C552, Type I.
- D. Floor Assemblies Above Unconditioned Spaces:

1. Mineral Fiber Board: ASTM C612, Type IB or Type II.
2. Perlite Board: ASTM C728.
3. Cellular Glass Block: ASTM C552, Type I.

E. Masonry Cavity Wall Insulation:

1. Mineral Fiber Board: ASTM C612, Type II, with vapor retarder facing; maximum permeance 29 ng/Pa/s/sq. m (0.5 perms).
2. Polyurethane or Polyisocyanurate Board: ASTM C591, Type I, with vapor retarder facing; maximum permeance 29 ng/Pa/s/sq. m (0.5 perms).
3. Polystyrene Board: ASTM C578, Type X.
4. Perlite Board: ASTM C728.
5. Cellular Glass Block: ASTM C552, Type I or IV.

F. Masonry Fill Insulation:

1. Vermiculite Insulation: ASTM C516, Type II.
2. Perlite Insulation: ASTM C549, Type IV.

2.3 ACOUSTICAL INSULATION

A. Semi Rigid, Batts and Blankets:

1. Widths and lengths to fit tight against framing.
2. Mineral Fiber boards: ASTM C553, Type II, flexible, or Type III, semi rigid FSK faced.
 - a. Density: nominal 4.5 pound.
3. Mineral Fiber Batt or Blankets: ASTM C665 FSK faced.
4. Maximum Surface Burning Characteristics: ASTM E84.
 - a. Flame Spread Rating: 25.
 - b. Smoke Developed Rating: 450.

B. Sound Deadening Board:

1. Mineral Fiber Board: ASTM C612, Type IB.
 - a. Thickness: 13 mm (1/2 inch).
2. Perlite Board: ASTM C728.
 - a. Thickness: 13 mm (1/2 inch).

2.4 ACCESSORIES

A. Fasteners:

1. Staples or Nails: ASTM F1667, zinc-coated, size and type to suit application.
2. Screws: ASTM C954 or ASTM C1002, size and length to suit application with washer minimum 50 mm (2 inches) diameter.

3. Impaling Pins: Steel pins with head minimum 50 mm (2 inches) diameter.
 - a. Length: As required to extend beyond insulation and retain cap washer when washer is placed on pin.
 - b. Adhesive: Type recommended by manufacturer to suit application.
- B. Insulation Adhesive:
 1. Nonflammable type recommended by insulation manufacturer to suit application.
- C. Tape:
 1. Pressure sensitive adhesive on one face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install insulation with vapor barrier facing the heated side, unless indicated otherwise.
- C. Install board and block insulation with joints close and flush, in regular courses, and with end joints staggered.
- D. Install batt and blanket insulation with joints tight. Fill framing voids completely. Seal penetrations, terminations, facing joints, facing cuts, tears, and unlapped joints with tape.
- E. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

3.3 THERMAL INSULATION

- A. Perimeter Insulation In Contact with Soil:
 1. Vertical insulation:
 - a. Fill joints of insulation with same material used for bonding.
 - b. Bond polystyrene board to surfaces with adhesive.

- c. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.
 2. Horizontal insulation under concrete floor slab:
 - a. Lay insulation boards and blocks horizontally on level, compacted and drained fill.
 - b. Extend insulation from foundation walls towards center of building minimum 600 mm (24 inches).
- B. Exterior Framing or Furring Insulation:
 1. General:
 - a. Open voids are not acceptable.
 - b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
 - c. Pack behind outlets, around pipes, ducts, and services encased in walls.
 - d. Hold insulation in place with pressure sensitive tape.
 - e. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.
 2. Metal Studs:
 - a. Fasten insulation between metal studs, framing, and furring with pressure sensitive tape continuous along flanged edges.
 3. Wood Studs:
 - a. Fasten insulation between wood studs or framing with nails or staples through flanged edges on face of stud.
 - b. Space fastenings maximum 150 mm (six inches) apart.
 4. Roof Rafters and Floor Joists:
 - a. Friction fit insulation between framing to provide minimum 50 mm (2 inch) air space between insulation and roof sheathing and subfloor.
 5. Ceilings and Soffits:
 - a. Wood Framing:
 - 1) Fasten blanket insulation between wood framing and joists with nails or staples through flanged edges of insulation.
 - 2) Space fastenings maximum 150 mm (6 inches) on center.
 - b. Metal Framing:
 - 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.

- 2) At metal framing and ceilings suspension systems, install insulation above suspended ceilings and metal framing at right angles to main runners and framing.
- 3) Tape insulation tightly together without gaps. Cover metal framing members with insulation.

c. Ceiling Transitions:

- 1) In areas where suspended ceilings transition to structural ceiling, install blanket or batt insulation.
- 2) Extend insulation from suspended ceiling to underside of structure above.
- 3) Secure blanket and batt with continuous cleats to structure above.

C. Inside Face of Exterior Wall Insulation:

1. Location: On interior face of solid masonry and concrete walls, beams, beam soffits, underside of floors, and to face of studs to support interior wall finish where indicated.
2. Bond insulation to solid vertical surfaces with adhesive. Fill joints with adhesive cement.
3. Fasten board insulation to face of studs with screws, nails or staples. Space fastenings maximum 300 mm (12 inches) on center. Stagger fasteners at board joints. Install fasteners at each corner.

D. Floor Assemblies Above Unconditioned Spaces:

1. Use impaling pins for attach insulation to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.
 - a. Bond insulation with adhesive when separate vapor retarder is used.

E. Masonry Cavity Wall Insulation:

1. Install insulation on exterior faces of concrete and masonry inner wythes of cavity walls.
2. Bond polystyrene board to surfaces with adhesive.
3. Bond mineral polyurethane or polyisocyanurate board, and perlite board to surfaces with adhesive.
4. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.
5. Fill insulation joints with same material used for bonding.

F. Masonry Fill Insulation:

1. Pour fill insulation in masonry unit hollow cores from tops of walls, or from sill where windows or other openings occur.
2. Pour in lifts of maximum 6 m (20 feet).

3.4 ACOUSTICAL INSULATION

A. General:

1. Install insulation without voids.
2. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
3. Pack behind outlets, around pipes, ducts, and services encased in walls.
4. Hold insulation in place with pressure sensitive tape.
5. Lap facer flanges together over framing for continuous surface. Seal all penetrations through the insulation and facers.
6. Do not compress insulation below required thickness except where embedded items prevent required thickness.

B. Semi Rigid, Batts and Blankets:

1. Semi Rigid Batts and Blankets:

- a. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedments.
- b. Wood Framing:
 - 1) Fasten blanket insulation between wood framing and joists with nails or staples through flanged edges of insulation.
 - 2) Space fastenings maximum 150 mm (6 inches) on center.
- c. Metal Framing:
 - 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
 - 2) At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing.
 - 3) Tape insulation tightly together so no gaps occur and metal framing members are covered by insulation.

C. Sound Deadening Board:

1. Secure with adhesive to masonry and concrete walls and with screws to metal and wood framing. Secure sufficiently in place until subsequent cover is installed. Seal all cracks with caulking.

3.5 CLEANING

- A. Remove excess adhesive before adhesive sets.

3.6 PROTECTION

- A. Protect insulation from construction operations.
- B. Repair damage.

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**SECTION 07 22 00
ROOF AND DECK INSULATION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
- B. Roof and deck insulation, substrate board, vapor retarder, and cover board on existing concrete and wood substrates ready to receive roofing or waterproofing membrane.
- C. Repairs and alteration work to existing roof insulation.

1.2 RELATED REQUIREMENTS

- A. Non-Flooring Adhesives and Sealants VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Wood Cants, Blocking, and Edge Strips: Section 06 10 00, ROUGH CARPENTRY.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):
 - 1. Standard 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. ASTM International (ASTM):
 - 1. C208-12 - Cellulosic Fiber Insulating Board.
 - 2. C552-15 - Cellular Glass Thermal Insulation.
 - 3. C726-05 - Mineral Fiber Roof Insulation Board.
 - 4. C728-15 - Perlite Thermal Insulation Board.
 - 5. C1177/C1177M-13 - Glass Mat Gypsum Substrate for Use as Sheathing.
 - 6. C1278/C1278M-07a(2015) - Fiber-Reinforced Gypsum Panel.
 - 7. C1289-15 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 8. C1396/C1396M-14a - Gypsum Board.
 - 9. D41/D41M-11 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - 10. D312-06 - Asphalt Used in Roofing.
 - 11. D1970/D1970M-15 - Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

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12. D2178/D2178M-15 - Asphalt Glass Felt Used in Roofing and Waterproofing.
 13. D2822/D2822M-11 - Asphalt Roof Cement, Asbestos Containing.
 14. D4586/D4586M-07(2012)e1 - Asphalt Roof Cement, Asbestos-Free.
 15. E84-15a - Surface Burning Characteristics of Building Materials.
 16. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.
- D. National Roofing Contractors Association (NRCA):
1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.
- E. U.S. Department of Agriculture (USDA):
1. USDA BioPreferred Program Catalog.
- F. UL LLC (UL):
1. Listed - Online Certifications Directory.
- G. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
1. DOC PS 1-09 - Structural Plywood.
 2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and installation details.
 - a. Nailers, cants, and terminations.
 - b. Layout of insulation showing slopes, tapers, penetrations, and edge conditions.
- C. Manufacturer's Literature and Data:
1. Description of each product.
- D. Samples:
1. Roof insulation, each type.
 2. Fasteners, each type.
- E. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 2. Biobased Content:
 - a. Show type and quantity for each product.
 3. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.

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b. Certify each composite wood product contain no added urea formaldehyde.

- F. Qualifications: Substantiate qualifications meet specifications.
1. Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Same installer as Division 07 roofing section installer.

1.6 DELIVERY

- A. Comply with recommendations of NRCA Manual.
- B. Deliver products in manufacturer's original sealed packaging.
- C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, and manufacture date.
- D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Comply with recommendations of NRCA Manual.
- B. Store products indoors in dry, weathertight facility.
- C. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Environment:
1. Install products when existing and forecasted weather permit installation according to manufacturer's instructions.

1.9 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant substrate board, vapor retarder, insulation, and cover board against material and manufacturing defects as part of Division 07 roofing system warranty.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Insulation Thermal Performance:
1. Overall Average R-Value: RSI-57 (R-33), minimum.
 2. Any Location R-Value: RSI-17 (R-10), minimum.

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- B. Fire and Wind Uplift Resistance: Provide roof insulation complying with requirements specified in Division 07 roofing section.
- C. Insulation on Combustible Decking: UL labeled indicating compliance with one of the following:
 - 1. UL Listed.
 - 2. Insulation Surface Burning Characteristics: When tested according to ASTM E84.
 - a. Flame Spread Rating: 75 maximum.
 - b. Smoke Developed Rating: 150 maximum.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.
- B. Sustainable Construction Requirements:
 - 1. Insulation Recycled Content:
 - a. Rigid Foam: 9 percent total recycled content, minimum.
 - b. Glass Fiber Reinforced Rigid Foam: 6 percent total recycled content, minimum.
 - 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.
 - b. Composite wood and agrifiber.
 - 3. Bio-Based Materials: Where applicable, provide products designated by USDA and meeting or exceeding USDA recommendations for bio-based content, and products meeting Rapidly Renewable Materials and certified sustainable wood content definitions; refer to www.biopreferred.gov.

2.3 ADHESIVES

- A. Primer: ASTM D41/D41M.
- B. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.
- C. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to adhere roof insulation to substrate or to another insulation layer.
- D. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane

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adhesive formulated to adhere roof insulation to substrate or to another insulation layer.

- E. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to adhere roof insulation to substrate or to another insulation layer.
- F. Roof Cement: Asbestos free, ASTM D2822/D2822M, Type I or Type II; or, ASTM D4586/D4586M, Type I or Type II.

2.4 ROOF AND DECK INSULATION

- A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, faced with glass fiber reinforced cellulosic felt facers on both major surfaces of the core foam.
- C. Cellular Glass Board Insulation: ASTM C552, Type IV, kraft-paper sheet faced.
- D. Perlite Board Insulation: ASTM C728, expanded perlite particles, selected binders, and cellulosic fibers with surface treated to reduce bitumen absorption.
- E. Cellulosic Fiber Board Insulation: ASTM C208, Type II, Grade 2 for single-ply roofing.
- F. Tapered Roof Insulation System:
 - 1. Fabricate of mineral fiberboard, polyisocyanurate, perlite board, or cellular glass. Use only one insulation material for tapered sections. Use only factory-tapered insulation.
 - 2. Cut to provide high and low points with crickets and slopes as shown.
 - 3. Minimum thickness of tapered sections; 38 mm (1-1/2 inch).
 - 4. Minimum slope 1/48 (1/4 inch per 12 inches).
- G. Composite Nail Base Insulated Roof Sheathing:
 - 1. Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Polyisocyanurate thermal insulation ASTM C1289, Type V, insulation thickness as shown, with oriented strand board laminated to top surface.
 - 2. Oriented Strand Board: NIST DOC PS 1, Exposure 1, 11 mm (7/16 inch) thick.
 - 3. Bottom surface faced with felt facers.

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2.5 INSULATION ACCESSORIES

- A. Glass (Felt): ASTM D2178/D2178M, Type VI, heavy duty ply sheet.
- B. Cants and Tapered Edge Strips:
 - 1. Wood Cant Strips: Refer to Section 06 10 00, ROUGH CARPENTRY.
 - 2. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
 - 3. Tapered Edge Strips: 1/12 (1 inch per 12 inches), from 0 mm (0 inches), 300 mm to 450 mm (12 inches to 18 inches) wide.
 - a. Cellulosic Fiberboard: ASTM C208.
 - b. Mineral Fiberboard: ASTM C726.
 - c. Perlite Board: ASTM C728.
- C. Vapor Retarder:
 - 1. Glass-Fiber Felts: ASTM D2178/D2178M, Type IV, asphalt impregnated.
 - 2. Self-Adhering Sheet Vapor Retarder: ASTM D1970/D1970M, minimum 1.0 mm (40 mils) thick membrane of HDPE film fully coated with asphalt adhesive, or 0.76 to 1.0 mm (30 to 40 mils) thick membrane of butyl rubber based adhesive backed by a layer of high density cross-laminated polyethylene; maximum permeance rating of 6 ng/Pa/s/sq. m (0.1 perms).
- D. Cover Board:
 - 1. Oriented Strand Board: DOC PS 2, Exposure 1, 11 mm (7/16 inch) thick.

2.6 ACCESSORIES

- A. Fasteners: Corrosion-resistant carbon steel fasteners and galvalume-coated steel or plastic round plates for fastening substrate board and insulation to roof deck.
- B. Nails: ASTM F1667; type to suit application.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Comply with requirements of Division 07 roofing section.

3.2 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.

3.3 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions.

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1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Comply with requirements of UL for insulated steel roof deck.
- C. Attach substrate board and other products to meet requirements of Division 07 roofing section.

3.4 SUBSTRATE BOARD INSTALLATION

- A. Fasten substrate board to top flanges of steel decking to resist uplift pressures according requirements for specified roofing system.
 1. Locate the long dimension edge joints solidly bearing on top of decking ribs.

3.5 VAPOR RETARDER INSTALLATION

- A. Vapor Retarder Installation, General:
 1. Install continuous vapor retarder on roof decks where indicated.
 2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
 3. Seal penetrations through vapor retarder with roof cement to prevent moisture entry from below.
- B. Precast Concrete Unit Decks Without Concrete Topping:
 1. Prime deck as specified.
 2. Apply two plies of asphalt saturated felt.
 3. Mop to deck, keeping bitumen 100 mm (4 inches) away from joints of precast units. Bridge joints with felt. Mop between plies as specified.

3.6 INSULATION INSTALLATION

- A. Insulation Installation, General:
 1. Base Sheet: Where required by roofing system, install one lapped base sheet specified in Division 07 roofing section by mechanically fastening to roofing substrate before installation of insulation.
 2. Cant Strips: Install preformed insulation cant strips or wood cant strips specified in Section 06 10 00 ROUGH CARPENTRY at junctures of roofing system with vertical construction.
 3. Use same insulation as existing for roof repair and alterations unless specified otherwise.
- B. Insulation Thickness:

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1. Thickness of roof insulation shown on drawings is nominal. Provide thickness required to comply with specified thermal performance.
 2. When actual insulation thickness differs from drawings, coordinate alignment and location of roof drains, flashing, gravel stops, fascias and similar items.
 3. Where tapered insulation is used, maintain insulation thickness at high points and roof edges shown on drawings.
 - a. Low Point Thickness: Minimum 38 mm (1-1/2 inches).
 4. Use minimum two layers of insulation when required thickness is 68 mm (2.7 inch) or greater.
- C. Lay insulating units with close joints, in regular courses and with end joints staggered.
1. Stagger joints between layers minimum 150 mm (6 inches).
- D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.
- E. Seal cut edges at penetrations and at edges against blocking with bitumen or roof cement.
- F. Cut to fit tightly against blocking or penetrations.
- G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.
- H. Installation Method:
1. Adhered Insulation:
 - a. Prime substrate as required.
 - b. Set each layer of insulation firmly in solid mopping of hot asphalt.
 - c. Set each layer of insulation firmly in ribbons of bead-applied insulation adhesive.
 - d. Set each layer of insulation firmly in uniform application of full-spread insulation adhesive.
 2. Mechanically Fastened Insulation:
 - a. Fasten insulation according to requirements in Division 07 roofing section.
 - b. Fasten insulation to resist uplift pressures specified in Division 07 roofing section.
 3. Mechanically Fastened and Adhered Insulation:
 - a. Fasten first layer of insulation according to "Mechanically Fastened Insulation" requirements.

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- b. Fasten each subsequent layer of insulation according to "Adhered Insulation" requirements.

3.7 COVER BOARD INSTALLATION

- A. Install cover boards over insulation with long joints in continuous straight lines with staggered end joints.
- B. Offset cover board joints from insulation joints 150 mm (6 inches), minimum.
- C. Secure cover boards according to "Adhered Insulation" requirements.

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SECTION 07 53 23
ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ethylene Propylene Diene Monomer (EPDM) sheet roofing adhered roof deck.
2. Fire rated roof system.

1.2 RELATED REQUIREMENTS

- A. Non-Flooring Adhesives and Sealants VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Preparation of Existing Membrane Roofs and Repair Areas: Section 07 01 50.19, PREPARATION FOR REROOFING.
- C. Substrate Board, Vapor Retarder, Roof Insulation, and Cover Board: Section 07 22 00, ROOF AND DECK INSULATION.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
 1. FX-1-01(R2006) - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
 2. RP-4 2013 - Wind Design Standard for Ballasted Single-ply Roofing Systems.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
 1. 7-10 - Minimum Design Loads For Buildings and Other Structures.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. ASTM International (ASTM):
 1. A276/A276M-15 - Stainless Steel Bars and Shapes.
 2. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 3. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 4. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
 5. C140/C140M-15 - Sampling and Testing Concrete Masonry Units and Related Units.

6. C936/C936M-15 - Solid Concrete Interlocking Paving Units.
 7. C1371-15 - Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 8. C1549-09(2014) - Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 9. D751-06(2011) - Coated Fabrics.
 10. D1248-12 - Polyethylene Plastics Extrusion Materials for Wire and Cable.
 11. D1876-08(2015)e1 - Peel Resistance of Adhesives (T-Peel Test).
 12. D2103-15 - Polyethylene Film and Sheeting.
 13. D2240-05(2010) - Rubber Property-Durometer Hardness.
 14. D3884-09(2013)e1 - Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method).
 15. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
 16. D4586/D4586M-07(2012)e1 - Asphalt Roof Cement, Asbestos-Free.
 17. D4637/D4637M-14e1 - EPDM Sheet Used In Single-Ply Roof Membrane.
 18. E96/E96M-15 - Water Vapor Transmission of Materials.
 19. E408-99(2015) - Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 20. E1918-06(2015) - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 21. E1980-11 - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 22. G21-15 - Resistance of Synthetic Polymeric Materials to Fungi.
- F. Cool Roof Rating Council (CRRC):
1. 1-15 - Product Rating Program.
- G. Federal Specifications (Fed. Spec.):
1. UU-B-790A - Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant).
- H. Florida Department of Business and Professional Regulation (FL):
1. Approved - Product Approval.
- I. National Roofing Contractors Association (NRCA):
1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.
- J. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog.
- K. UL LLC (UL):
1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.
 2. 1897-15 - Uplift Tests for Roof Covering Systems.

- L. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
 - 1. DOC PS 1-09 - Structural Plywood.
 - 2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.
- M. U.S. Environmental Protection Agency (EPA):
 - 1. Energy Star - ENERGY STAR Program Requirements for Roof Products Version 2.3

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at the Project site minimum 30 days before beginning Work of this section.
 - 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.
 - d. Manufacturer's field representative.
 - e. Other installers responsible for adjacent and intersecting work, including roof deck, flashings, roof specialties, roof accessories, utility penetrations, rooftop curbs and equipment, lightning protection.
 - 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
 - j. Pull out test of fasteners.
 - k. Material storage, including roof deck load limitations.
 - 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Roofing membrane layout.
 - 2. Roofing membrane seaming and joint details.
 - 3. Roof membrane penetration details.
 - 4. Base flashing and termination details.
 - 5. Paver anchoring locations and details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Minimum fastener pull out resistance.
 - 3. Installation instructions.
 - 4. Warranty.
 - 5. Product Data for Federally-Mandated Bio-Based Materials: For roof materials, indicating USDA designation and compliance with definitions for bio-based products, Rapidly Renewable Materials, and certified sustainable wood content.
- D. Sustainable Construction Submittals:
 - 1. Solar Reflectance Index (SRI) for roofing membrane.
 - 2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
 - 3. Energy Star label for roofing membrane.
- E. Samples:
 - 1. Roofing Membrane: 150 mm (6 inch) square.
 - 2. Base Flashing: 150 mm (6 inch) square.
 - 3. Fasteners: Each type.
 - 4. Roofing Membrane Seam: 300 mm (12 inches) square.
- F. Certificates: Certify products comply with specifications.
 - 1. Fire and windstorm classification.
 - 2. Energy performance requirements.
- G. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Installer, including supervisors.
 - 2. Manufacturer's field representative.
- H. Field quality control reports.
- I. Temporary protection plan. Include list of proposed temporary materials.
- J. Operation and Maintenance Data:

1. Maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Approved by roofing system manufacturer as installer for roofing system with specified warranty.
2. Regularly installs specified products.
3. Installed specified products with satisfactory service on five similar installations for minimum five years.
4. Employs full-time supervisors experienced installing specified system and able to communicate with Contracting Officer's Representative and installer's personnel.

B. Manufacturer's Field Representative:

1. Manufacturer's full-time technical employee or independent roofing inspector.
2. Individual certified by Roof Consultants Institute as Registered Roof Observer.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.8 STORAGE AND HANDLING

- A. Comply with NRCA Manual storage and handling requirements.
- B. Store products indoors in dry, weathertight facility.
- C. Store adhesives according to manufacturer's instructions.
- D. Protect products from damage during handling and construction operations.
- E. Products stored on the roof deck must not cause permanent deck deflection.

1.9 FIELD CONDITIONS

A. Environment:

1. Product Temperature: Minimum 4 degrees C (40 degrees F) and rising before installation.
2. Weather Limitations: Install roofing only during dry current and forecasted weather conditions.

1.10 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant roofing system against material and manufacturing defects and agree to repair any leak caused by a defect in the roofing system materials or workmanship of the installer.
 - 1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Roofing System: Adhered roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, copings, edge metal and walkway pads.

2.2 SYSTEM PERFORMANCE

- A. Design roofing system meeting specified performance:
 - 1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
 - a. Uplift Pressures:
Design to area specific codes.
 - 2. Energy Performance:
 - a. EPA Energy Star Listed for low-slope roof products.
 - b. ASTM E1980; Minimum 78 Solar Reflectance Index (SRI).
 - c. CRRC-1; Minimum 0.70 initial solar reflectance and minimum 0.75 emissivity.
 - d. Three-Year Aged Performance: Minimum 0.55 solar reflectance tested in according to ASTM C1549 or ASTM E1918, and minimum 0.75 thermal emittance tested in according to ASTM C1371 or ASTM E408.

Where tested aged values are not available:

Calculate compliance adjusting initial solar reflectance according to ASHRAE 90.1.

Provide roofing system with minimum 64 three-year aged Solar Reflectance Index calculated according to ASTM E1980 with 12 W/sq. m/degree K (2.1 BTU/h/sq. ft.) convection coefficient.

2.3 PRODUCTS - GENERAL

- A. Provide roof system components from one manufacturer.

B. Sustainable Construction Requirements:

1. Bio-Based Materials: Where applicable, provide products designated by USDA and meeting or exceeding USDA recommendations for bio-based content, and products meeting Rapidly Renewable Materials and certified sustainable wood content definitions; refer to www.biopreferred.gov.
2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.

2.4 EPDM ROOFING MEMBRANE

A. EPDM Sheet: ASTM D4637/D4637M, Type I - non-reinforced.

1. Thickness: 1.5 mm (60 mils).

B. Additional Properties:

| PROPERTY | TEST METHOD | REQUIREMENT |
|-----------------------|---------------|--|
| Shore A Hardness | ASTM D2240 | 55 to 75 Durometer |
| Water Vapor Permeance | ASTM E96/E96M | Minimum 8 ng/Pa/s/sq. m (0.14 perms) Water Method |
| Fungi Resistance | ASTM G21 | After 21 days, no sustained growth or discoloration. |

1. Use fire retardant membrane when not protected by ballast or pavers. Verify for UL or approval.

2.5 MEMBRANE ACCESSORY MATERIALS

- A. Sheet roofing manufacturer's specified products.
- B. Flashing Sheet: Manufacturer's standard; same material, and color as roofing membrane.
 1. Self-curing EPDM flashing adaptable to irregular shapes and surfaces.
 2. Minimum Thickness: 1.5 mm (0.060 inch).
- C. Factory Formed Flashings: Inside and outside corners, pipe boots, and other special flashing shapes to minimize field fabrication.
- D. Splice Adhesive or Tape: Manufacturer's standard for roofing membrane and flashing sheet.

- E. Splice Lap Sealant: Liquid EPDM rubber for exposed lap edge.
- F. Bonding Adhesive: Manufacturer's standard, solvent based, to suit substrates.
- G. Termination Bars: Manufacturer's standard, stainless steel or aluminum, 25 mm wide by 3 mm thick (1 inch wide by 1/8 inch thick) factory drilled for fasteners.
- H. Battens: Manufacturer's standard, galvanized or galvanized steel, 25 mm wide by 1.3 mm thick (1 inch wide by 0.05 inch thick), factory punched for fasteners.
- I. Pipe Compression Clamp:
 - 1. Stainless steel drawband.
 - 2. Worm drive clamp device.
- J. Fasteners: Manufacturer's standard coated steel with metal or plastic plates, to suit application.
- K. Fastener Sealer: One part elastomeric adhesive sealant.
- L. Temporary Closure Sealers (Night Sealant): Polyurethane two part sealer.
- M. Primers, Splice Tapes, Cleaners, and Butyl Rubber Seals: As specified by roof membrane manufacturer.
- N. Asphalt Roof Cement: ASTM D4586/D4586M.

2.6 FASTENERS

- A. Fasteners and washers required for securing pavers together with straps and to walls or other anchorage:
 - 1. Straps for Securing Pavers Together:
 - a. Stainless Steel: ASTM A276/A276M, Type 302 or 304, minimum 0.46 mm (0.018 inch) thick.
 - b. Aluminum Strap: ASTM B209/B209M, minimum 2.39 mm (0.094 inch) thick.
 - c. Round corners on straps.
 - d. Form straps 38 mm (1-1/2 inches) wide, 3 m (10 feet) maximum length with 6 by 10 mm (1/4 by 3/8 inch) punched slotted holes at 100 mm (4 inch) centers centered on width of strap. Punch hole size 2 mm (1/16 inch) larger than fastener shank when shank is thicker than 5 mm (3/16 inch).
- B. Fasteners or Connectors for Pavers:
 - 1. For Concrete Pavers: Extruded interlocking hollow shape polyethylene connector:

- a. ASTM D1248, Type 1, low density, Class C, black weather resistant, Grade E6, tensile strength 15 MPa (2200 psi), Shore D hardness of 4, brittleness low temperature - 82 degrees C (180 degrees F), softening temperature above 80 degrees C (176 degrees F).
 - b. Length: 50 mm (2 inches), with center stop and insert leg with ribs to resist withdrawal; minimum 1.3 mm (0.05 inch) thick.
2. Fasteners for Pavers Straps:
- a. Stainless steel as recommended by manufacturer of paver in which fastener is anchored.
 - b. Fasteners that are not acceptable include:
 - Impact or power actuated fasteners.
 - Fasteners that do not require a predrilled pilot hole.
 - Fasteners with lead or white metal anchors.
 - Plastic anchors not stabilized against ultraviolet light.

2.7 SEPARATION SHEET

- A. Polyethylene Film: ASTM D2103, 0.2 mm (6 mils) thick.
- B. Building Paper: Fed. Spec. UU-B-790.
 1. Water Vapor Resistance: Type I, Grade A, Style 4, reinforced.
 2. Water Vapor Permeable: Type I, Grade D, Style 4, reinforced.

2.8 FLEXIBLE TUBING

- A. Closed cell neoprene, butyl polyethylene, vinyl, or polyethylene tube or rod.
- B. Diameter approximately 1-1/2 times joint width.

2.9 WALKWAY PADS

- A. Manufacturer's standard, slip resistant, approximately 450 mm by 450 mm (30 by 30 inches) square and 5 mm (3/16 inch) thick with rounded corners.

2.10 PROTECTION MAT OR SEPARATOR SHEET

- A. Protection Mat:
 1. Water pervious; either woven or non-woven sheet of long chain polymeric filaments or yarns such as polypropylene, black polyethylene, polyester, or polyamide; or, polyvinylidene-chloride formed into a pattern with distinct and measurable openings.
 2. Filter fabric equivalent opening size (EOS): Not finer than the U.S.A. Standard Sieve Number 120 and not coarser than the U.S.A.

Standard Sieve Number 100. EOS is defined as the number of the U.S.A. Standard Sieve having openings closest in size to the filter cloth openings.

3. Edges of fabric selvaged or otherwise finished to prevent raveling.
4. Abrasion Resistance:
 - a. After being abraded in conformance with ASTM D3884 using rubber-hose abrasive wheels with one kg load per wheel and 1000 revolutions, perform tensile strength test as specified in ASTM D1682, paragraph.
 - b. Result: 25 kg (55 lbs.) minimum in any principle direction.
5. Puncture Strength:
 - a. ASTM D751 tension testing machine with ring clamp; steel ball replaced with an 8 mm (5/16 inch) diameter solid steel cylinder with a hemispherical tip centered within the ring clamp.
 - b. Result: 57 kg (125 lbs.) minimum.
6. Non-degrading under a wet or humid condition within minimum 4 degrees C (40 degrees F) to maximum 66 degrees C (150 degrees F) when exposed to ultraviolet light.
7. Minimum Sheet Width: 2400 mm (8 feet).

2.11 BALLAST

- A. Ballast: ASTM D1863; with sized according to ASTM D448.
 1. Size 2 for 146 kg/sq. m (30 lbs./sq. ft.) or more.
 2. Size 3 for 122 kg/sq. m (25 lbs./sq. ft.) or more.
 3. Size 5 for 73 kg/sq. m (15 lbs./sq. ft.) or more.
 4. Size 6 for 49 kg/sq. m (10 lbs./sq. ft.) or more.

2.12 ACCESSORIES

- A. Temporary Protection Materials:
 1. Expanded Polystyrene (EPS) Insulation: ASTM C578.
 2. Plywood: NIST DOC PS 1, Grade CD Exposure 1.
 3. Oriented Strand Board (OSB): NIST DOC PS 2, Exposure 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine and verify substrate suitability for product installation with roofing installer and roofing inspector present.
 1. Verify roof penetrations are complete, secured against movement, and firestopped.

2. Verify roof deck is adequately secured to resist wind uplift.
 3. Verify roof deck is clean, dry, and in-plane ready to receive roofing system.
- B. Correct unsatisfactory conditions before beginning roofing work.

3.2 PREPARATION

- A. Complete roof deck construction before beginning roofing work:
1. Curbs, blocking, edge strips, and other components to which roofing and base flashing is attached in place ready to receive insulation and roofing.
 2. Coordinate roofing membrane installation with flashing work and roof insulation work so insulation and flashing are installed concurrently to permit continuous roofing operations.
 3. Complete installation of flashing, insulation, and roofing in same day except for the area where temporary protection is required when work is stopped for inclement weather or end of work day.
- B. Dry out surfaces including roof deck flutes, that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates, only.
- C. Broom clean roof decks. Remove dust, dirt and debris.
- D. Remove projections capable of damaging roofing materials.
- E. Concrete Decks, except Insulating Concrete:
1. Test concrete decks for moisture according to ASTM D4263 before installing roofing materials.
 2. Prime concrete decks. Keep primer back 100 mm (four inches) from precast concrete deck joints.
 3. Allow primer to dry before application of bitumen.
- F. Insulating Concrete Decks:
1. Allow deck to dry out minimum five days after installation before installing roofing materials.
 2. Allow additional drying time when precipitation occurs before installing roofing materials.
- G. Existing Membrane Roofs and Repair Areas:
1. Comply with Section 07 01 50.19 PREPARATION FOR REROOFING.

3.3 TEMPORARY PROTECTION

- A. Install temporary protection consisting of a temporary seal and water cut-offs at the end of each day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.

- B. Install temporary cap flashing over top of base flashings where permanent flashings are not in place to protect against water intrusion into roofing system. Securely anchor in place to prevent blow off and damage by construction activities.
- C. Temporarily seal exposed insulation surfaces within roofing membrane.
 - 1. Apply temporary seal and water cut off by extending roofing membrane beyond insulation and securely embedding edge of the roofing membrane in 6 mm (1/4 inch) thick by 50 mm (2 inches) wide strip of temporary closure sealant. Weight roofing membrane edge with sandbags, to prevent displacement; space sandbags maximum 2400 mm (8 feet) on center.
 - 2. Direct water away from work. Provide drainage, preventing water accumulation.
 - 3. Check daily to ensure temporary seal remains watertight. Reseal open areas and weight down.
- D. Before the work resumes, cut off and discard portions of roof membrane in contact with temporary seal.
 - 1. Cut minimum 150 mm (6 inches) back from sealed edges and surfaces.
- E. Remove sandbags and store for reuse.

3.4 INSTALLATION, GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Comply with NRCA Manual installation requirements.
- C. Comply with UL 580 for uplift resistance.
- D. Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil, grease, or other substances incompatible with EPDM.

3.5 ROOFING INSTALLATION

- A. Install membrane perpendicular to long dimension of insulation boards.
- B. Begin membrane installation at roof low point and work towards high point. Lap membrane shingled in water flow direction.
- C. Position membrane free of buckles and wrinkles.
- D. Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas:

1. Allow 30 minutes for membrane to relax before proceeding.
2. Lap edges and ends minimum 75 mm (3 inches). Clean lap surfaces.
3. Install seam adhesive or tape, unless furnished with factory applied adhesive strips. Apply pressure to develop full adhesion.
4. Check seams to ensure continuous adhesion and correct defects.
5. Finish seam edges with beveled bead of lap sealant.
6. Finish seams same day as membrane is installed.
7. Anchor membrane perimeter to roof deck and parapet wall as indicated on drawings.

E. Membrane Perimeter Anchorage:

1. Install batten with fasteners at perimeter of each roof area, curb flashing, expansion joints and similar penetrations on top of roof membrane as indicated on drawings.
2. Mechanical Fastening:
 - a. Space fasteners maximum 300 mm (12 inches) on center, starting 25 mm (1 inch) from ends.
 - b. When battens are cut, round edge and corners before installing.
 - c. Set fasteners in lap sealant and cover fastener head with fastener sealer, including batten.
 - d. Stop batten where batten interferes with drainage. Space ends of batten 150 mm (6 inch) apart.
 - e. Cover batten with 225 mm (9 inch) wide strip of flashing sheet. Seal laps with lap seam adhesive and finish edges with lap sealant.
 - f. At fascia-cants turn roofing membrane down over front edge of blocking, cant, or nailer. Secure roofing membrane to vertical portion of nailer; with fasteners spaced maximum 150 mm (6 inches) on centers.
 - g. At parapet walls intersecting building walls and curbs, secure roofing membrane to structural deck with fasteners 150 mm (6 inches) on center or as shown in NRCA Manual.

F. Adhered System Installation:

1. Apply bonding adhesive in quantities required by roofing membrane manufacturer.
2. Fold sheet back on itself, clean and coat the bottom side of the membrane and the top of substrate with adhesive. Do not coat the lap joint area.

3. After adhesive has set according to adhesive manufacturer's instructions, roll roofing membrane into adhesive minimizing voids and wrinkles.
 4. Repeat for other half of sheet.
 5. Cut voids and wrinkles to lay flat. Clean and patch cut area.
- G. Loosely Laid and Ballasted System Installation:
1. Loosely lay roofing membrane.
 2. Adhere membrane to comply with ANSI/SPRI RP-4 requirements.

3.6 FLASHING INSTALLATION

- A. Install flashings on same day as roofing membrane is installed. When flashing cannot be completely installed in one day, complete installation until flashing is watertight and provide temporary covers or seals.
- B. Flashing Roof Drains:
1. Install roof drain flashing according to roofing membrane manufacturer's instructions.
 - a. Coordinate to set the metal drain flashing in asphalt roof cement, holding cement back from the edge of the metal flange.
 - b. Do not allow roof cement to contact EPDM roofing membrane.
 - c. Adhere roofing membrane to metal flashing with bonding adhesive.
 2. Turn metal drain flashing and roofing membrane down into drain body. Install clamping ring and strainer.
- C. Installing Base Flashing and Pipe Flashing:
1. Install flashing sheet to pipes, walls and curbs to minimum 200 mm (8 inches) height above roof surfaces and extend roofing manufacturer's standard lap dimension onto roofing membranes.
 - a. Adhere flashing with bonding adhesive.
 - b. Form inside and outside corners of flashing sheet according to NRCA Manual. Form pipe flashing according to NRCA Manual.
 - c. Lap ends roofing manufacturer's standard dimension.
 - d. Adhesively splice flashing sheets together, and adhesively splice flashing sheets to roofing membranes. Finish exposed edges with lap sealant.
 2. Anchor top of flashing to walls and curbs with fasteners spaced maximum 150 mm (6 inches) on center. Use surface mounted fastening strip with sealant on ducts. Use pipe clamps on pipes or other round penetrations.

3. Apply sealant to top edge of flashing.
- D. Installing Building Expansion Joints:
1. Install base flashing on curbs as specified.
 2. Coordinate installation with roof expansion joint system.
 3. Install flexible tubing 1-1/2 times width of joint centered over joint. Cover tubing with flashing sheet adhered to base flashing and lapping base flashing roofing manufacturer's standard dimension. Finish edges of laps with lap sealant.
- E. Repairs to Membrane and Flashings:
1. Remove sections of roofing membrane or flashing sheet that are creased, wrinkled, or fishmouthed.
 2. Cover removed areas, cuts and damaged areas with patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Adhesively splice patch to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

3.7 WALKWAY PAD INSTALLATION

- A. Clean membrane where pads are applied.
- B. Adhere pads to membrane with splicing cement.
- C. Layout with minimum 25 mm (1 inch) and maximum 50 mm (2 inch) space between pads.

3.8 FIELD QUALITY CONTROL

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
1. Fastener Pull Out Tests: ANSI/SPRI FX-1; one test for every 230 sq. m (2,500 sq. ft.) of deck. Perform tests for each combination of fastener type and roof deck type before installing roof insulation.
 - a. Test at locations selected by Contracting Officer's Representative.
 - b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.
 - c. Test Results:
Repeat tests using different fastener type or use additional fasteners achieve pull out resistance required to meet specified wind uplift performance.
Patch cementitious deck to repair areas of fastener tests holes.

2. Examine and probe roofing membrane and flashing seams in presence of Contracting Officer's Representative and Manufacturer's field representative.
 3. Probe seams to detect marginal bonds, voids, skips, and fishmouths.
 4. Cut 100 mm (4 inch) wide by 300 mm (12 inch) long samples through seams where directed by Contracting Officer's Representative.
 5. Cut one sample for every 450 m (1500 feet) of seams.
 6. Cut samples perpendicular to seams.
 7. Failure of samples to pass ASTM D1876 test will be cause for rejection of work.
 8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
 9. Repair fishmouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.
- B. Manufacturer Services:
1. Inspect initial installation, installation in progress, and completed work.
 2. Issue supplemental installation instructions necessitated by field conditions.
 3. Prepare and submit inspection reports.
 4. Certify completed installation complies with manufacturer's instructions and warranty requirements.

3.9 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed roofing surfaces. Remove contaminants and stains to comply with specified solar reflectance performance.

3.10 PROTECTION

- A. Protect roofing system from traffic and construction operations.
 1. Protect roofing system when used for subsequent work platform, materials storage, or staging.
 2. Distribute scaffolding loads to exert maximum 50 percent roofing system materials compressive strength.
- B. Loose lay temporary insulation board overlaid with plywood or OSB.
 1. Weight boards to secure against wind uplift.
- C. Remove protection when no longer required.
- D. Repair damage.

- - E N D - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fasciae, drainage specialties, and formed expansion joint covers are specified in this section.

1.2 RELATED WORK

- A. Manufactured flashing, copings, roof edge metal, and fasciae:
Section 07 71 00 ROOF SPECIALTIES.
- B. Flashing components of factory finished roofing and wall systems:
Division 07 roofing and wall system sections.
- C. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Integral flashing components of manufactured roof specialties and accessories or equipment: Section 07 71 00, ROOF SPECIALTIES, Section 07 72 00, ROOF ACCESSORIES.

1.3 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.
- B. Aluminum Association (AA):
 - AA-C22A41.....Aluminum Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick
 - AA-C22A42.....Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick
 - AA-C22A44.....Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish
- C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
 - ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

- D. American Architectural Manufacturers Association (AAMA):
 - AAMA 620.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum
 - AAMA 621.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
- E. ASTM International (ASTM):
 - A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
 - A653/A653M-11.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process
 - B32-08.....Solder Metal
 - B209-10.....Aluminum and Aluminum-Alloy Sheet and Plate
 - B370-12.....Copper Sheet and Strip for Building Construction
 - D173-03 (R2011).....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
 - D412-06 (R2013).....Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - D1187-97 (R2011).....Asphalt Base Emulsions for Use as Protective Coatings for Metal
 - D1784-11.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
 - D4586-07.....Asphalt Roof Cement, Asbestos Free
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
- G. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500-06.....Metal Finishes Manual
- H. Federal Specification (Fed. Spec):
 - A-A-1925A.....Shield, Expansion; (Nail Anchors)

UU-B-790A.....Building Paper, Vegetable Fiber

I. International Code Commission (ICC): International Building Code,
Current Edition

1.4 PERFORMANCE REQUIREMENTS (NOT USED)

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: For all specified items, including:
 - 1. Flashings
 - 2. Copings
 - 3. Gravel Stop-Fascia
 - 4. Gutter and Conductors
 - 5. Expansion joints
 - 6. Fascia-cant
- C. Manufacturer's Literature and Data: For all specified items, including:
 - 1. Two-piece counterflashing
 - 2. Thru wall flashing
 - 3. Expansion joint cover, each type
 - 4. Nonreinforced, elastomeric sheeting
 - 5. Copper clad stainless steel
 - 6. Polyethylene coated copper
 - 7. Bituminous coated copper
 - 8. Copper covered paper
 - 9. Fascia-cant
- D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

- A. Stainless Steel: ASTM A240, Type 302B, dead soft temper.
- B. Copper ASTM B370, cold-rolled temper.
- C. Bituminous Coated Copper: Minimum copper ASTM B370, weight not less than 1 kg/m² (3 oz/sf). Bituminous coating shall weigh not less than 2 kg/m² (6 oz/sf); or, copper sheets may be bonded between two layers of coarsely woven bitumen-saturated cotton fabric ASTM D173. Exposed fabric surface shall be crimped.

- D. Copper Covered Paper: Fabricated of electro-deposit pure copper sheets ASTM B 370, bonded with special asphalt compound to both sides of creped, reinforced building paper, UU-B-790, Type I, style 5, or to a three ply sheet of asphalt impregnated creped paper. Grooves running along the width of sheet.
- E. Polyethylene Coated Copper: Copper sheet ASTM B370, weighing 1 Kg/m² (3 oz/sf) bonded between two layers of (two mil) thick polyethylene sheet.
- F. Aluminum Sheet: ASTM B209, alloy 3003-H14.
- G. Galvanized Sheet: ASTM, A653.
- H. Nonreinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheeting shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m² (6 lbs/100 sf).
- C. Bituminous Paint: ASTM D1187, Type I.
- D. Fasteners:
 - 1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
 - 2. Nails:
 - a. Minimum diameter for copper nails: 3 mm (0.109 inch).
 - b. Minimum diameter for aluminum nails 3 mm (0.105 inch).
 - c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
 - d. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
 - 3. Rivets: Not less than 3 mm (1/8 inch) diameter.

4. Expansion Shields: Fed Spec A-A-1925A.
- E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- F. Insect Screening: ASTM D3656, 18 by 18 regular mesh.
- G. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
- B. Concealed Locations (Built into Construction):
 1. Copper: 30g (10 oz) minimum 0.33 mm (0.013 inch thick).
 2. Stainless steel: 0.25 mm (0.010 inch) thick.
 3. Copper clad stainless steel: 0.25 mm (0.010 inch) thick.
 4. Galvanized steel: 0.5 mm (0.021 inch) thick.
- C. Exposed Locations:
 1. Copper: 0.4 Kg (16 oz).
 2. Stainless steel: 0.4 mm (0.015 inch).
 3. Copper clad stainless steel: 0.4 mm (0.015 inch).
- D. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

- A. Jointing:
 1. In general, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
 2. Jointing of copper over 0.5 Kg (20 oz) weight or stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
 3. Joints shall conform to following requirements:
 - a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
 - b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
 - c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
 4. Flat and lap joints shall be made in direction of flow.
 5. Edges of bituminous coated copper, copper covered paper, nonreinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 100 mm (4 inches) in the

direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.

6. Soldering:

- a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.
- b. Wire brush to produce a bright surface before soldering lead coated copper.
- c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
- d. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for copper, stainless steel, and copper clad stainless steel at intervals not exceeding 7200 mm (24 feet).
4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips 1.25 mm (0.050 inch) thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).
6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using (0.0625 inch) thick aluminum.

E. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.

F. Edges:

1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 6 mm (1/4 inch) to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 6 mm (1/4 inch) minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
3. All metal roof edges shall meet requirements of IBC, current edition.

G. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISHES

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 - 1. Copper: Mill finish.
 - 2. Stainless Steel: Finish No. 2B or 2D.
 - 3. Aluminum:
 - a. Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1 Architectural, 18 mm (0.7 mils) thick.
 - b. Colored Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 18 mm (0.7 mils) thick. Dyes will not be accepted.
 - c. Fluorocarbon Finish: AAMA 620, high performance organic coating.
 - d. Mill finish.
 - 4. Steel and Galvanized Steel:
 - a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.
 - b. Manufacturer's finish:
 - 1) Baked on prime coat over a phosphate coating.
 - 2) Baked-on prime and finish coat over a phosphate coating.
 - 3) Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 THROUGH-WALL FLASHINGS

- A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.
 - 1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
 - 2. Fabricate so keying nests at overlaps.
- B. For Masonry Work When Concealed Except for Drip:
 - 1. Either copper, stainless steel, or copper clad stainless steel.
 - 2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.

3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.
- C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:
1. Use same metal and thickness as counter flashing.
 2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
 3. Form exposed portion as snap lock receiver for counter flashing upper edge.
- D. For Flashing at Architectural Precast Concrete Panels or Stone Panels.
1. Use plan flat sheet of stainless steel.
 2. Form exposed portions with drip as specified or receiver.
- E. Window Sill Flashing and Lintel Flashing:
1. Use either copper, stainless steel, copper clad stainless steel plane flat sheet, or nonreinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.
 2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
 3. Turn up back edge as shown.
 4. Form exposed portion with drip as specified or receiver.
- F. Door Sill Flashing:
1. Where concealed, use either 0.5 Kg (20 oz) copper, 0.5 mm (0.018 inch) thick stainless steel, or 0.5 mm (0.018 inch) thick copper clad stainless steel.
 2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 0.6 Kg (24 ounce) copper, 0.6 mm (0.024 inch) stainless steel, or 0.6 mm (0.024 inch) thick stainless steel.
 3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

2.7 BASE FLASHING

- A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
1. Use either copper, or stainless steel, thickness specified unless specified otherwise.
 2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use either 0.5 Kg (20 oz) copper or 0.5 mm (0.018 inch) stainless steel.

3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
4. Use either copper, or stainless steel at pipe flashings.
- B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).
- C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.
- D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.
- E. Pipe Flashing: (Other than engine exhaust or flue stack)
 1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
 2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
 3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
 - a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
 - b. Allow for loose fit around and into the pipe.
 4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
 - a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
 - b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING (CAP FLASHING OR HOODS)

- A. Either copper or stainless steel, unless specified otherwise.
- B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
 1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
 2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
 3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
 4. Manufactured assemblies may be used.

5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
 6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.
- C. One-piece Counterflashing:
1. Back edge turned up and fabricate to lock into reglet in concrete.
 2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).
- D. Two-Piece Counterflashing:
1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
 2. Counterflashing upper edge designed to snap lock into receiver.
- E. Surface Mounted Counterflashing; one or two piece:
1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
 2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
 3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.
- F. Pipe Counterflashing:
1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
 2. Fabricate 100 mm (4 inch) over lap at end.
 3. Fabricate draw band of same metal as counter flashing. Use 0.6 Kg (24 oz) copper or 0.33 mm (0.013 inch) thick stainless steel or copper coated stainless steel.
 4. Use stainless steel bolt on draw band tightening assembly.

5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.
- G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.9 GRAVEL STOPS

A. General:

1. Fabricate in lengths not less than 2400 mm (8 feet) long and maximum of 3000 mm (10 feet).
2. Fabricate internal and external corners as one-piece with legs not less than 600 mm (2 feet) or more than 1200 mm (4 feet) long.
3. Fabricate roof flange not less than 100 mm (4 inches) wide.
4. Fabricate top edge to extend above roof not less than 25 mm (one inch) for embedded gravel aggregate and not less than 100 mm (4 inches) for loose laid ballast.
5. Fabricate lower edge outward at an angle of 45 degrees to form drip and as fascia or as counter flashing as shown:
 - a. Fabricate of one-piece material of suitable width for fascia height of 250 mm (10 inch) maximum or counterflashing lap of not less than 100 mm (4 inch) over base flashing.
 - b. Fabricate bottom edge of formed fascia to receive edge strip.
 - c. When fascia bottom edge forms counter flashing over roofing lap roofing not less than 150 mm (6 inches).

B. Formed Flat Sheet Metal Gravel Stops and Fascia:

1. Fabricate as shown of 1.25 mm (0.050 inch) thick aluminum.
2. When fascia exceeds 150 mm (6 inches) in depth, form one or more horizontal stops not less than 13 mm (1/2 inch) high in the fascia.
3. Fabricate as two-piece fascia when fascia depth exceeds 250 mm (10 inches).
4. At joint between ends of sheets, provide a concealed clip soldered or welded near one end of each sheet to hold the adjoining sheet in lapped position. The clip shall be approximately 100 mm (4 inches) wide and shall be the full depth of the fascia less 25 mm (one inch) at top and bottom. Clip shall be of the same thickness as the fascia.
5. Provide edge strip as specified with lower hooked edge bent outward at an angle of 45 degrees.

- C. Formed (Corrugated Sheet) Sheet Metal Gravel Stops and Fascia:
1. Fabricate as shown of 0.8 mm (0.032 inch) thick aluminum.
 2. Sheets shall have 2 mm (1/16 inch) deep corrugations either transversely or diagonally rolled into the sheet. Crimped sheets are not acceptable.
 3. Factory fabricate prepackaged system, complete with fastenings.
 4. Provide concealed flashing splice plate at joints not less than 150 mm (6 inches) long and continuous edge strip at lower edge of fascia made from same metal.
 5. Fabricate as two-piece fascia when fascia depth exceeds 175 mm (7 inches).

2.10 BITUMEN STOPS

- A. Fabricate bitumen stops for bituminous roofing edges for use with formed sheet metal gravel stops, pipe penetrations, and other penetrations through roof deck without a curb.
- B. Fabricate with 19 mm (3/4 inch) vertical legs and 75 mm (3 inch) horizontal legs.
- C. When used with gravel stop or metal base flashing use same metal for bitumen stop in thickness specified for concealed locations.

2.11 HANGING GUTTERS

- A. Fabricate gutters of not less than the following:
 2. 0.5mm (0.018 inch) thick stainless steel
 3. 0.6mm (0.025inch) thick aluminum..
- B. Fabricate hanging gutters in sections not less than 2400 mm (8 feet) long, except at ends of runs where shorter lengths are required.
- C. Building side of gutter shall be same height as exterior side.
- D. Gutter Bead: Stiffen outer edge of gutter by folding edge over approximately 19 mm (3/4 inch) toward roof and down approximately 19 mm (3/4 inch) unless shown otherwise.
- E. Gutter Spacers:
 1. Fabricate of same material and thickness as gutter.
 2. Fabricate 25 mm (one inch) wide strap and fasten to gutters not over 900 mm (36 inches) on center.
 3. Turn back edge up 25 mm (one inch) and lap front edge over gutter bead.
 4. Rivet and solder to gutter except rivet and seal to aluminum.
- F. Outlet Tubes:

1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch). Flange upper end of outlet tube 13 mm (1/2 inch).
2. Lock and solder longitudinal seam except use sealant in lieu of solder with aluminum.
3. Solder tube to gutter. Seal aluminum tube to gutter and rivet to gutter.
4. Fabricate basket strainers of same material as gutters.

G. Gutter Brackets:

1. Fabricate of same metal as gutter. Use the following:
 - a. 3 by 25 mm (1/8 by 1 inch stainless steel.
 - b. 5 by 25 mm (3/16 by 1 inch aluminum.
2. Fabricate to gutter profile.
3. Drill two 5 mm (3/16 inch) diameter holes in anchor leg for countersunk flat head screws.

2.12 CONDUCTORS (DOWNSPOUTS)

- A. Fabricate conductors of same metal and thickness as gutters in sections approximately 3000 mm (10 feet) long with 19 mm (3/4 inch) wide flat locked seams .
- B. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.
- C. Fabricate conductor brackets or hangers of same material as conductor, 2 mm (1/16 inch) thick by 25 mm (one inch) minimum width. Form to support conductors 25 mm (one inch) from wall surface in accordance with Architectural Sheet Metal Manual Plate 34, Design C for rectangular shapes and E for round shapes.
- D. Conductor Heads:
 1. Fabricate of same material as conductor.
 2. Fabricate conductor heads to not less than 250 mm (10 inch) wide by 200 mm (8 inch) deep by 200 mm (8 inches) from front to back.
 3. Form front and side edges channel shape not less than 13 mm (1/2 inch) wide flanges with edge hemmed.
 4. Slope bottom to sleeve to conductor or downspout at not less than 60 degree angle.
 5. Extend wall edge not less than 25 mm (one inch) above front edge.
 6. Solder joints for water tight assembly.

7. Fabricate outlet tube or sleeve at bottom not less than 50 mm (2 inches) long to insert into conductor.

2.13 SPLASHPANS

- A. Fabricate splashpans from the following:
 1. 0.4 mm (0.015 inch) thick stainless steel.
 2. 1.25 mm (0.050 inch) thick aluminum.
- B. Fabricate in accordance with Architectural Sheet Metal Manual Plate 35 with not less than two ribs as shown in alternate section.

2.14 REGLETS

- A. Fabricate reglets of one of the following materials:
 1. Stainless steel, not less than 0.3 mm (0.012 inch) thick.
 2. Plastic coated extruded aluminum, not less than 1.4 mm (0.055 inch) thick prefilled with butyl rubber sealer and complete with plastic wedges inserted at 1000 mm (40 inches) on centers.
- B. Fill open-type reglets with fiberboard or other suitable separator, to prevent crushing of the slot during installation.
- C. Bend edges of reglets for setting into concrete to an angle of not less than 45 degrees, and make wide enough to provide firm anchorage in the concrete.
- D. Fabricate reglets for building into horizontal masonry mortar joints not less than 19 mm (3/4 inch) deep, nor more than 25 mm (one inch) deep.
- E. Fabricate mitered corners, fittings, and special shapes as may be required by details.
- F. Reglets for concrete may be formed to receive flashing and have a 10 mm (3/8 inch), 45 degree snap lock.

2.15 INSULATED EXPANSION JOINT COVERS

- A. Either type optional, use only one type throughout.
- B. Types:
 1. Construct of two preformed, stainless steel strips, not less than 0.4 mm (0.015 inch) thick, mechanically and adhesively bonded to both sides of a 2 mm (1/16 inch) thick neoprene or butyl sheet, or to a 0.4 mm (32 mil) thick reinforced chlorinated polyethylene sheet. Adhesively attach a 10 mm (3/8 inch) thick sheet of closed cell, neoprene foam insulation, to the underside of the neoprene, butyl, or chlorinated polyethylene sheet.

2. Constructed of a 2 mm (1/16 inch) thick vinyl sheet, flanged at both sides with stainless steel strips not less than 0.4 mm (0.015 inch) thick. Vinyl sheet locked and encased by the stainless steel strip and prepunched for nailing. A 10 mm (3/8 inch) thick closed cell polyvinyl chloride foam insulating strip shall be heat laminated to the underside of the vinyl sheet between the stainless steel strips.
- C. Expansion joint covers shall have factory fabricated mitered corners, crossing tees, and other necessary accessories. Furnish in the longest available lengths.
- D. Metal flange of sufficient width to extend over the top of the curb and down curb sides 50 mm (2 inches) with hemmed edge for lock to edge strip.

2.16 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING

- A. Flashing at penetrations through roofing shall consist of a metal collar, sheet metal flashing sleeve and hood.
- B. Fabricate collar with roof flange of 1.2 mm (0.047 inch) minimum thick black iron or galvanized steel sheet.
 1. Fabricate inside diameter of collar 100 mm (4 inches) larger than the outside diameter of the item penetration the roofing.
 2. Extend collar height from structural roof deck to not less than 350 mm (14 inches) above roof surface.
 3. Fabricate collar roof flange not less than 100 mm (4 inches) wide.
 4. Option: Collar may be of steel tubing 3 mm (0.125 inch) minimum wall thickness, with not less than four, 50 mm x 100 mm x 3 mm (2 inch by 4 inch by 0.125 inch) thick tabs bottom edge evenly spaced around tube in lieu of continuous roof flange. Full butt weld joints of collar.
- C. Fabricate sleeve base flashing with roof flange of either copper, stainless steel, or copper clad stainless steel.
 1. Fabricate sleeve roof flange not less than 100 mm (4 inches) wide.
 2. Extend sleeve around collar up to top of collar.
 3. Flange bottom of sleeve out not less than 13 mm (1/24 inch) and soldered to 100 mm (4 inch) wide flange to make watertight.
 4. Fabricate interior diameter 50 mm (2 inch) greater than collar.
- D. Fabricate hood counter flashing from same material and thickness as sleeve.

1. Fabricate the same as pipe counter flashing except allow not less than 100 mm (4 inch) lap below top of sleeve and to form vent space minimum of 100 mm (4 inch) wide.
 2. Hem bottom edge of hood 13 mm (1/2 inch).
 3. Provide a 50 mm (2 inch) deep drawband.
- E. Fabricate insect screen closure between sleeve and hood. Secure screen to sleeve with sheet metal screws.

2.17 SCUPPERS

- A. Fabricate scuppers with minimum of 100 mm (4 inch) wide flange.
- B. Provide flange at top on through wall scupper to extend to top of base flashing.
- C. Fabricate exterior wall side to project not less than 13 mm (1/2 inch) beyond face of wall with drip at bottom outlet edge.
- D. Fabricate not less than 100 mm (4 inch) wide flange to lap behind gravel stop fascia.
- E. Fabricate exterior wall flange for through wall scupper not less than 25 mm (one inch) wide on top and sides with edges hemmed.
- F. Fabricate gravel stop bar of 25 mm x 25 mm (one by one inch) angle strip soldered to bottom of scupper.
- G. Fabricate scupper not less than 200 mm (8 inch) wide and not less than 125 mm (5 inch) high for through wall scupper.
- H. Solder joints watertight.

2.18 GOOSENECK ROOF VENTILATORS

- A. Form of 1.3 mm (0.0508 inch) thick sheet aluminum, reinforce as necessary for rigidity, stiffness, and connection to curb, and to be watertight.
 1. Form lower-edge to sleeve to curb.
 2. Curb:
 - a. Form for 100 mm (4 inch) high sleeve to ventilator.
 - b. Form for concealed anchorage to structural curb and to bear on structural curb.
 - c. Form bottom edge of curb as counterflashing to lap base flashing.
- B. Provide open end with 1.6 mm (16 gage), stainless steel wire guard of 13 mm (1/2 inch) square mesh.
 1. Construct suitable aluminum angle frame to retain wire guard.
 2. Rivet angle frame to end of gooseneck.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
7. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.

12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
17. Bitumen Stops:
 - a. Install bitumen stops for built-up roof opening penetrations through deck and at formed sheet metal gravel stops.
 - b. Nail leg of bitumen stop at 300 mm (12 inch) intervals to nailing strip at roof edge before roofing material is installed.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.

5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
 6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
 7. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
 8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
 9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
 10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
 11. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
 12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
 13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
 14. Continue flashing around columns:
 - a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
 - b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).
- B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.
- C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).
- D. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if

any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.

E. Flashing at Veneer Walls:

1. Install near line of finish floors over shelf angles or where shown.
2. Turn up against sheathing.
3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
4. At concrete backing, extend flashing into reglet as specified.
5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.

F. Lintel Flashing when not part of shelf angle flashing:

1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

G. Window Sill Flashing:

1. Install flashing to extend not less than 100 mm (4 inch) beyond ends of sill into vertical joint of masonry or veneer.
2. Turn back edge up to terminate under window frame.
3. Turn ends up 25 mm (one inch) and fold corners to form dam and extend to face of wall.

H. Door Sill Flashing:

1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
2. Extend sill flashing 200 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 150 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

I. Flashing at Masonry, Stone, or Precast Concrete Copings:

1. Install flashing with drips on both wall faces unless shown otherwise.

2. Form penetration openings to fit tight against dowel or other item with edge turned up. Seal penetrations with sealant.

3.3 BASE FLASHING

- A. Install where roof membrane type base flashing is not used and where shown.
 1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
 2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
 3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
 4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.
- B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.
- C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

- A. General:
 1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
 2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
 3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
 4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
 5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.

6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.
- B. One Piece Counterflashing:
1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
 2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
 3. Where flashing is surface mounted on flat surfaces.
 - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
 - 1) Locate fasteners in masonry mortar joints.
 - 2) Use screws to sheet metal or wood.
 - b. Fill joint at top with sealant.
 4. Where flashing or hood is mounted on pipe.
 - a. Secure with draw band tight against pipe.
 - b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
 - c. Completely fill joint at top with sealant.
- C. Two-Piece Counterflashing:
1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
 2. Surface applied type receiver:
 - a. Secure to face construction in accordance, with manufacturers instructions.
 - b. Completely fill space at the top edge of receiver with sealant.
 3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
- D. Where vented edge occur install so lower edge of counterflashing is against base flashing.
- E. When counter flashing is a component of other flashing install as shown.

3.5 REGLETS

- A. Install reglets in a manner to provide a watertight installation.

- B. Locate reglets not less than 225 mm (9 inch) nor more than 400 mm (16 inch) above roofing, and not less than 125 mm (5 inch) nor more than 325 mm (13 inch) above cant strip.
- C. Butt and align end joints of each section of reglet and securely hold in position until concrete or mortar are hardened:
 - 1. Coordinate reglets for anchorage into concrete with formwork construction.
 - 2. Coordinate reglets for masonry to locate horizontally into mortar joints.

3.6 GRAVEL STOPS

- A. General:
 - 1. Install gravel stops and fascias with allowance for expansion at each joint; minimum of 6 mm (1/4 inch).
 - 2. Extend roof flange of gravel stop and splice plates not less than four inches out over roofing and nail or screw to wood nailers. Space fasteners on 75 mm (3 inch) centers in staggered pattern.
 - 3. Install continuous cleat for fascia drip edge. Secure with fasteners as close to lower edge as possible on 75 mm (3 inch) centers.
 - 4. Where ends of gravel stops and fascias abut a vertical wall, provide a watertight, flashed and sealant filled joint.
 - 5. Set flange in roof cement when installed over built-up roofing.
 - 6. Edge securement for low-slope roofs: Low-slope membrane roof systems metal edge securement, except gutters, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609, of IBC 2003.
- B. Sheet metal gravel stops and fascia:
 - 1. Install with end joints of splice plates sheets lapped three inches.
 - 2. Hook the lower edge of fascia into a continuous edge strip.
 - 3. Lock top section to bottom section for two piece fascia.
- C. Corrugated sheet gravel stops and fascia:
 - 1. Install 300 mm (12 inch) wide sheet flashing centered under joint. A combination bottom and cover plate, extending above and beneath the joint, may be used.
 - 2. Hook lower edge of fascia into a continuous edge strip.
- D. Scuppers:
 - 1. Install scupper with flange behind gravel stops; leave 6 mm (1/4 inch) joint to gravel stop.

2. Set scupper at roof water line and fasten to wood blocking.
3. Use sealant to seal joint with fascia gravel stops at ends.
4. Coordinate to lap over conductor head and to discharge water into conductor head.

3.7 COPINGS

A. General:

1. On walls topped with a wood plank, install a continuous edge strip on the front and rear edge of the plank. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.
2. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
3. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.

B. Aluminum Coping:

1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
2. Install joint covers, centered at each joint, and securely lock in place.

C. Stainless steel Copings:

1. Join ends of sheets by a 19 mm (3/4 inch) locked and soldered seam, except at intervals of 9600 mm (32 feet), provide a 38 mm (1 1/2 inch) loose locked expansion joint filled with sealant or mastic.
2. At straight runs between 7200 mm (24 feet) and 19200 mm (64 feet) locate expansion joint at center.
3. At straight runs that exceed 9600 mm (32 feet) and form the leg of a corner locate the expansion joint not more than 4800 mm (16 feet) from the corner.

3.8 EXPANSION JOINT COVERS, INSULATED

- A. Install insulated expansion joint covers at locations shown on curbs not less than 200 mm (8 inch) high above roof surface.
- B. Install continuous edge strips of same metal as expansion joint flange, nailed at not less than 75 mm (3 inch) centers.
- C. Install insulated expansion joint covers in accordance with manufacturer's directions locking edges to edge strips.

3.9 ENGINE EXHAUST PIPE OR STACK FLASHING

- A. Set collar where shown and secure roof tabs or flange of collar to structural deck with 13 mm (1/2 inch) diameter bolts.
- B. Set flange of sleeve base flashing not less than 100 mm (4 inch) beyond collar on all sides as specified for base flashing.
- C. Install hood to above the top of the sleeve 50 mm (2 inch) and to extend from sleeve same distance as space between collar and sleeve beyond edge not sleeve:
 - 1. Install insect screen to fit between bottom edge of hood and side of sleeve.
 - 2. Set collar of hood in high temperature sealant and secure with one by 3 mm (1/8 inch) bolt on stainless steel draw band type, or stainless steel worm gear type clamp. Install sealant at top of head.

3.10 HANGING GUTTERS

- A. Hang gutters with high points equidistant from downspouts. Slope at not less than 1:200 (1/16 inch per foot).
- B. Lap joints, except for expansion joints, at least 25 mm (one inch) in the direction of flow. Rivet and seal or solder lapped joints.
- C. Support gutters in brackets spaced not more than 600 mm (24 inch) on centers, brackets attached to facial or wood nailer by at least two screws or nails.
 - 1. For copper or copper clad stainless steel gutters use brass or bronze brackets.
 - 2. For stainless steel gutters use stainless steel brackets.
 - 3. For aluminum gutters use aluminum brackets or stainless steel brackets.
 - 4. Use brass or stainless steel screws.
- D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.
- E. Gutter Expansion Joint:
 - 1. Locate expansion joints midway between outlet tubes.
 - 2. Provide at least a 25 mm (one inch) expansion joint space between end baffles of gutters.
 - 3. Install a cover plate over the space at expansion joint.
 - 4. Fasten cover plates to gutter section on one side of expansion joint only.

5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.

F. Outlet Tubes: Set bracket strainers loosely into gutter outlet tubes.

3.11 CONDUCTORS (DOWNSPOUTS)

A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.

B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 13 mm (1/2 inch) movement for each 3000 mm (10 feet) of downspout.

C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

3.12 SPLASH PANS

A. Install where downspouts discharge on low slope roofs unless shown otherwise.

B. Set in roof cement prior to pour coat installation or sealant compatible with single ply roofing membrane.

3.13 GOOSENECK ROOF VENTILATORS

A. Install on structural curb not less than 200 mm (8 inch) high above roof surface.

B. Securely anchor ventilator curb to structural curb with fasteners spaced not over 300 mm (12 inch) on center.

C. Anchor gooseneck to curb with screws having nonprene washers at 150 mm (6 inch) on center.

- - - E N D - - -

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies copings, gravel stops, fascias, and expansion joints.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Sealant Material and Installation: Section 07 92 00, JOINT SEALANTS.
- C. General Insulation: Section 07 21 13, THERMAL INSULATION
- D. Rigid Insulations for Roofing: Section 07 22 00, ROOF AND DECK INSULATION

1.3 QUALITY CONTROL:

- A. Provide roof accessories that products of manufacturers regularly engaged in producing the kinds of products specified.
- B. For each accessory type provide products made by the same manufacturer.
- C. Assemble each accessory to the greatest extent possible before delivery to the site.
- D. Provide each accessory with FM approval listing for class specified.

1.4 PERFORMANCE REQUIREMENTS:

- A. Provide roof accessories that withstand exposure to weather and resist thermal movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, or installation.
- B. Provide roof accessories listed in FM Approvals "RoofNav" and approved for windstorm classification Class. Identify materials with FM Approval markings.
- C. Manufacture and install roof accessories to allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 - 1. Provide clips that resist rotation and avoid shear stress as a result of thermal movements.

2. For design purposes, base provisions for thermal movement on assumed ambient temperature (range) from minus 18 degrees C (0 degrees F), ambient to 82 degrees C (180 degrees F).

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.
- C. Samples: Representative sample panel of color-anodized aluminum not less than 101 x 101 mm (4 x 4 inches), except extrusions are to be of a width not less than section to be used. Submit sample that shows coating with integral color and texture. Include manufacturer's identifying label.
- D. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.
- E. Manufacturer's Literature and Data: Each item specified.
- F. Certificates: Stating that aluminum has been given specified thickness of anodizing.

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. ASTM International (ASTM):
 - A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - A666-10.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
 - B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate
 - B209M-14.....Aluminum and Aluminum Alloy-Sheet and Plate (Metric)
 - B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

- B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire,
Shapes, and Tubes (Metric)
- B32-08 (R2014).....Solder Metal
- B370-12.....Copper Sheet and Strip for Building
Construction
- B882-10.....Pre-Patinated Copper for Architectural
Applications
- C612-14.....Mineral Fiber Block and Board Thermal
Insulation
- D1187/D1187M-97 (R2011)..Asphalt-Base Emulsions for Use as Protective
Coatings for Metal
- D1970/D1970M-14.....Self-Adhering Polymer Modified Bituminous Sheet
Materials Used as Steep Roofing Underlayment
for Ice Dam Protection
- D226/D226M-09.....Asphalt-Saturated Organic Felt Used in Roofing
and Waterproofing
- D4869/D4969M-05 (R2011)..Asphalt-Saturated Organic Felt Underlayment
Used In Steep Slope Roofing
- C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual
- D. American Architectural Manufacturers Association (AAMA):
2605-11.....High Performance Organic Coatings on
Architectural Extrusions and Panels.
611-14.....Anodized Architectural Aluminum
- E. FM Global (FM):
RoofNav.....Approved Roofing Assemblies and Products

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, Extruded: ASTM B221M (B221).
- B. Aluminum Sheet: ASTM B209M (B209).
- C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.
- D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- E. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.
- F. Recycled Content of Metal Products: Postconsumer recycled content plus
one-half of preconsumer recycled content not less than 30 percent.
- G. Insulation: ASTM C612, Class 1 or 2.
- H. Asphalt Coating: ASTM D1187, Type I, quick setting.

2.2 UNDERLAYMENT:

- A. Self-Adhering Modified Bitumen Underlayment:
1. Provide self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970/D1970M, suitable for use as underlayment for metal copings and fascias.
 2. Provide membrane resistant to cyclical elevated temperatures for extended period of time in high heat service conditions (stable after testing at 116 degrees C (240 degrees F)).
 3. Provide membrane with integral non-tacking top surface of polyethylene film or other surface material to serve as separator between bituminous material and metal products to be applied above.
 4. Provide primer.
- B. Felt Underlayment: Provide No. 30 asphalt saturated organic, non-perforated felt underlayment in compliance with ASTM D226/D226M, Type II, or ASTM D4869/D4869M.
- C. Slip Sheet: Provide 0.24 kg per square meter (5 pounds per 100 sf) rosin sized unsaturated building paper for slip sheet.

2.3 SOLDER:

- A. Copper Solder conforming to ASTM B32, lead-free solder.

2.4 COPINGS:

- A. Fabricate of aluminum sheet not less than 1.6-mm (0.063 inch) thick; 0.5 mm (0.018 inch) thick; stainless steel
- B. Turn outer edges down each face of wall as shown on construction documents.
- C. Maximum lengths of 3.05 M (10 feet).
- D. Shop fabricate external and internal corners as one-piece assemblies with not less than 305 mm (12 inch) leg lengths.
- E. Provide 101 mm (4 inch) wide 0.81 mm (0.032 inch) thick watertight joint covers.
- F. Provide anchor gutter bar of 0.81 mm (0.032 inch) thick with anchor holes formed for underside of joint.
- G. Provide concealed guttered splice plate of 0.81 mm (0.032 inch) thick with butyl or other resilient seal strips anchored to splice plate for underside of joint. Use galvanized steel anchor plate providing compression spring anchoring of coping cover.
- H. Finish: Two-coat fluoropolymer Color as specified.

2.5 EXTRUDED ALUMINUM GRAVEL STOPS AND FASCIAS:

- A. Fabricate of aluminum not less than 2 mm (0.078 inch) thick.
- B. Turn fascia down face of wall and up above roof as shown in construction documents.
- C. Maximum lengths of 3.05 M (10-feet).
- D. Shop fabricate external and internal corners as one (1)-piece assemblies with not less than 305 mm (12 inch) leg lengths.
- E. Provide 101 mm (4 inch) wide 2 mm (0.078 inch) thick watertight joint covers with 152 mm (6 inch) wide 0.8 mm (0.030 inch) thick underside joint flashing.
- F. Finish: Two-coat fluoropolymer Color as specified.

2.6 EXTRUDED ALUMINUM FASCIA-CANT SYSTEM:

- A. The fascia-cant system consists of three (3) pieces, an extruded aluminum fascia, a galvanized steel cant, and an aluminum compression clamp.
- B. Furnish in stock lengths of not more than 3.05 M (10 feet) long.
- C. Form fascia from not less than 2 mm (0.070 inch) thick aluminum. Provide 101 mm (4 inch) wide 0.81 mm (0.032-inch) thick concealed sheet aluminum joint cover plates in back of fascia.
- D. Form cant strip from galvanized steel not less than 0.75 mm (0.0299 inch) thick, to profile shown and design to hold lower edge of the fascia.
- E. Form compression clamp of not less than 0.81 mm (0.032 inch) thick aluminum designed to hold the top edge of the fascia and the built-up flashing.
- F. Internal and external corners:
 - 1. Factory fabricate and fully weld mitered joints.
 - 2. Furnish corner sections in manufacturers standard sizes.
- G. Factory fabricated fascia sump assemblies.
 - 1. Fabricate sump assemblies with stainless steel cores and extruded aluminum cover to match fascia-cant.
 - 2. Provide stainless steel outlet, tube sized to suit downspout and solder to core to make watertight.
 - 3. Furnish sump assembly in 508 mm (20 inch) minimum lengths.
- H. Factory fabricated scupper assemblies:

1. Fabricate scupper assembly with extended plates to match fascia-cant in 508 mm (20 inch) minimum lengths.
 2. Extend outlet opening not less than 50 mm (2 inches) with drip edge.
 3. Fabricate with stainless steel core or sleeve to drain water from toe of cant and flash in to built-up roofing with 101 mm (4 inch) wide flange.
- I. Finish on aluminum: Two-coat fluoropolymer Color as specified.

2.7 EXTRUDED ALUMINUM ROOF EXPANSION JOINT COVERS:

- A. Fabricate in 3.0 M (10 foot) lengths with fastener openings slotting for expansion not over 610 mm (24 inch) centers.
- B. Provide four-way expansion, for joint widths shown on construction documents.
- C. Mill finish.
- D. Form waterstop or moisture seals of continuous sheets of neoprene, not less than 0.81 mm (0.032 inch) thick.
- E. Fabricate corners as one (1) piece assembly with mitered and welded joint and least dimension legs not less than 300 mm (12 inches) long.
- F. Factory fabricate end caps and transitions to insure waterproof assembly.
- G. Five (5) piece assembly:
 1. Roof expansion joint cover system consists of an extruded aluminum cover, extruded frame or curb vertical section, galvanized steel cant, and aluminum compression clamp counter flashing, complete with moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080 inch) minimum thickness with spring stainless steel tension or pivot bar.
 2. Form cant from galvanized steel not less than 0.8 mm (0.029 inch) thick formed to profile shown on construction documents.
 3. Form splice plates of not less than 0.81 mm (0.032 inch) thick aluminum sheet.
 4. Form counter flashing member of 1.3 mm (0.050 inch) thick sheet aluminum, secured with screws to the top edge of the vertical section and providing compression clamp over base flashing.
 5. Provide compression gasket separating cover from curb bearing.
- H. Two (2) piece assembly:

1. Roof expansion joint system consists of an extruded aluminum cover combination extruded aluminum frame or curb with integral adjustable counter flashing flange, and moisture seals.
2. Form cover from extruded aluminum 2 mm (0.078 inch) minimum thickness.
3. Form cover anchor system of stainless steel pivot bar.
4. Form frame assembly of not less than 2 mm (0.076 inch) aluminum except for flashing portion.
5. Provide compression gasket separating cover from curb at bearing.

2.8 FINISH:

- A. In accordance with NAAMM AMP 500-505.
- B. Aluminum, Mill Finish: AA-MIX, as fabricated.
- C. Aluminum, Clear Anodic Finish AAMA 611: AA-M12C22A41, Class I, 0.017 mm (0.7 mil) thick (min.).
- D. Aluminum Color Anodic Finish AAMA 611: AA-C22A42 (anodized or AA0C22A44 (electrolytically deposited metallic compound), Dyes will not be accepted.
- E. Copper Sheet Finishes: Non-Patinated Finish: Mill finish.
- F. Fluoropolymer Finishes: High performance organic coating. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and top color coat.
 3. Two-Coat Mica Fluoropolymer: AAMA 2605. Fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat.
 4. Three-Coat Metallic Fluoropolymer: AAMA 2605. Fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 5. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.013 mm (0.5 mil).
- G. Stainless-Steel Finish: No. 2B bright, cold rolled, unpolished.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Examine substrates, areas, and conditions, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- C. Underlayment Installation:
 - 1. Self-Adhering Sheet Underlayment:
 - a. Apply primer as required by manufacturer.
 - b. Comply with temperature restrictions of underlayment manufacturer for installation.
 - c. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 152 mm (6 inches) staggered 610 mm (24 inches) between courses.
 - d. Overlap side edges not less than 89 mm (3-1/2 inches). Roll laps with roller.
 - e. Cover underlayment within 14 days.
 - f. Apply continuously under copings and roof-edge fascias and gravel stops.
 - g. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.
 - 2. Felt Underlayment:
 - a. Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties.
 - b. Apply in shingle fashion to shed water, with lapped joints of not less than 50 mm (2 inches).
 - 3. Slip Sheet:
 - a. Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties.
 - b. Apply in shingle fashion to shed water, with lapped joints of not less than 50 mm (2 inches).
- D. Install roof accessories where indicated in construction documents.
- E. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise. Provide fasteners suitable for application, for metal types being secured and designed to meet performance requirements.

- F. Where soldered joints are required, clean surfaces to be soldered, removing oils and foreign matter.
 - 1. Pre-tin edges of sheets to be soldered to a width of 38 mm (1-1/2 inches).
 - 2. Reduce pre-tinning where pre-tinned surface would show in completed work.
 - 3. Tin edges of uncoated copper sheets using solder for copper.
 - 4. Do not use torches for soldering.
 - 5. Heat surfaces to receive solder and flow solder into joint.
 - 6. Fill joint completely.
 - 7. Completely remove flux and spatter from exposed surfaces.
- G. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.
- H. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions.
- I. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
- J. Gravel Stops and Fascias:
 - 1. Install gravel stops and fascia with butt joints with approximately 6 mm (1/4 inch) space for expansion.
 - 2. Over each joint provide cover plates of sheet aluminum, complete with concealed sheet aluminum flashing, centered under each joint.
 - 3. Provide lap cover plates and concealed flashing over the gravel stop and fascia not less than 101 mm (4 inches).
 - 4. Extend concealed flashing over built-up roofing, embed in roof cement and turn down over face of blocking at roof edge.
- K. Aluminum Coping:
 - 1. Install sections of coping with approximately 6 mm (1/4-inch) space between ends of sections.
 - 2. Center joint gutter bar and covers at joints and lock in place.
 - 3. When snap-on system is installed ensure front and back edges are locked in place.
- L. Fascia-Cant System:
 - 1. Install galvanized steel cant; coordinate with roofing work and after completion of roofing work install extruded aluminum fascia, concealed joint cover plate, and aluminum compression clamp, where shown in construction documents.

2. Install system to allow for expansion and contraction with 6 mm (1/4 inch) space between extruded aluminum members and galvanized steel cant as required by manufacturer of system.
3. Offset joints in extruded aluminum members from galvanized steel cant joints.

M. Expansion Joint Covers:

1. Install to terminate base flashing 203 mm (8 inches) above roof.
2. Install moisture seals to drain water to outlets that do not permit water to enter building.
3. Provide stainless steel screws when exposed.
4. Three piece assembly:
 - a. Install curb section with screws to wood blocking, allowing 6 mm (1/4 inch) at butt joints between sections with splice plate at joint.
 - b. Install cant to wood blocking by nailing along horizontal flange every 152 mm (6 inches), with galvanized roofing nails 25 mm (1 inch) long.
 - c. After completion of base flashing install cap flashing and compression clamp and fasten to the curb or metal cant with stainless steel self-tapping screws with neoprene washers under head spaced approximately 457 mm (18 inches) on center.
 - d. Install expansion joint cover with a 6 mm (1/4 inch) wide end joints.
 - e. Install over end joint a cover plate complete with concealed aluminum flashing, centered under each joint. Fabricate flashing to lap cover not less than 101 mm (4 inches).
5. Two piece assembly:
 - a. Install curb section with screws allowing 6 mm (1/4 inch) space at end joints with splice plate at joint.
 - b. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
 - c. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 610 mm (24 inches) on center.
 - d. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 101 mm (4 inches).

3.2 PROTECTION OF ALUMINUM:

- A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one (1) side.
- B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two (2) coats of asphalt coating.

3.3 ADJUSTING:

- A. Adjust expansion joints to close tightly and be watertight; insuring maximum allowance for building movement.

3.4 PROTECTION:

- A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies roof hatches; equipment supports; gravity ventilators; and metal grating roof walkway system.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.
- D. General insulation: Section 07 21 13, THERMAL INSULATION. Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION

1.3 QUALITY ASSURANCE:

- A. Provide roof accessories that are the products of manufacturers regularly engaged in producing the kinds of products specified.
- B. For each accessory type provide the same product made by the same manufacturer.
- C. Assemble each accessory to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.
- C. Samples: Submit representative sample panel of color anodized aluminum not less than 101 x 101 mm (4 x 4 inches). For extrusions, submit width not less than section to be installed. Show coating with integral color and texture and include manufacturer's identifying label.
- D. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.
- E. Manufacturer's Literature and Data: Each item specified.
- F. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
 - RR-G-1602D.....Grating, Metal, Other Than Bar Type (Floor, Except for Naval Vessels)
- C. ASTM International (ASTM):
 - A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process
 - B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate
 - B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
 - B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 - C726-12.....Mineral Wool Roof Insulation Board
 - C1289-14a.....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - D1187/D1187M-97 (R2011)..Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- D. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 Series.....Metal Finishes Manual
- E. American Architectural Manufacturers Association (AAMA):
 - 2603-13.....Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
 - 2605-13.....High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 611-14.....Anodized Architectural Aluminum
 - 621-02.....High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
- F. American Society of Civil Engineers (ASCE):
 - ASCE 7-10.....Minimum Design Loads for Buildings and Other Structures

- G. U.S. National Archives and Records Administration (NARA):
29 CFR 1910.23.....Guarding Floor and Wall Openings and Holes

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, Extruded: ASTM B221M (B221).
- B. Aluminum Sheet: ASTM B209M (B209).
- C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.
- D. Metal Grating for Roof Walkway: Fed. Spec. RR-G-1602.
- E. Recycled Content of Metal Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.
- F. Asphalt Coating: ASTM D1187/D1187M, Type I, quick setting.

2.2 ROOF HATCH (SCUTTLE):

- A. Performance Characteristics:
 - 1. Cover to be reinforced to support a minimum live load of 195 kg per sq. m (40 lb. per sq. ft.) with a maximum deflection of 1/150th of the span or 97 kg per sq. m (20 lb. per sq. ft.) wind uplift.
 - 2. Operation of the Cover: Smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 3. Operation of the Cover: Not affected by temperature.
 - 4. Entire Hatch: Weathertight with fully welded corner joints on cover and curb.
- B. Shop fabricate from aluminum with mill finish.
- C. Curb and Cover:
 - 1. Exterior facing: Minimum 2.3 mm (0.09 inch) thick sheet aluminum with mill finish.
 - 2. Interior facing: Minimum 1 mm (0.04 inch) thick sheet aluminum.
 - 3. Minimum of 50 mm (2 inch) thick polyisocyanurate insulation (ASTM C1289) with a U-value = 0.47 W/m² K (R-value = 12) between facings of cover and over exterior face of curb.
 - 4. Form exterior curb facing with an integral 76 mm (3 inch) wide roof flange and cap flashing minimum 2.3 mm (0.09 inch) thick sheet aluminum.
 - 5. Make curb 305 mm (12 inches) above finish roof surface.
 - 6. Form cover to lap curb and cap flashing.
 - 7. Size opening as shown on construction documents.
- D. Hardware:

1. Provide spring snap latch with inside and outside operating handles and padlock hasp on inside. Provide two snap latches when hinge side is over 2100 mm (7 feet) long. Bolt hardware into heavy gauge channel reinforcement welded to the underside of the cover and concealed within the insulation space.
2. Provide heavy duty pintle hinges.
3. Provide automatic hold open and operating arm with enclosed torsion or compression spring lifting mechanism.
4. Latch Strike: Stamped component bolted or welded to the curb assembly.
5. Automatically lock in the open position at not less than 70 degrees.
6. Provide weatherstripping at cover closure.
7. Galvanize all hardware items.

E. Assembly:

1. Shop assemble roof scuttle.
2. Weld joints exposed to the weather and built into the roofing.
3. Finish weld smooth where exposed.

F. Safety Accessories:

1. Ladder Assist Post: Provide a telescoping tubular section that locks automatically when fully extended. Control upward and downward movement by a stainless steel spring balancing mechanism. Provide unit completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer's instructions.
2. Safety Railing: Provide a fixed, attached to the roof hatch railing assembly including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; complying with 29 CFR 1910.23 requirements.

2.3 EQUIPMENT SUPPORTS:

- A. Supported Load Capacity:
- B. Fabricate equipment supports from 1.3 mm (0.0516 inch) thick galvanized ASTM A653/A653M steel fabricate with welded corners and with seams joined by continuous water and air tight welds.
- C. Equipment supports to be internally reinforced with angles 1.22 m (48 inches) on center.
- D. Form exterior curb with integral base, and deck closures for curbs installed on steel decking.

- E. Use galvanized steel liners for curbs having inside dimension over 305 mm (12 inches).
- F. Internally insulate with 38 mm (1-1/2 inch) glass-fiber board insulation (ASTM C726).
- G. Fabricate curb with a minimum height of 203 mm (8 inches) above roof surface.
- H. Attach preservative treated wood nailers to top of curb. Provide 50 mm (2 inch) by 50 mm (2 inch) minimum nominal size on curb with openings and 50 mm (2 inch) thick, width of curb up to 305 mm (12 inches) on equipment support curbs.
- H. Make size of supports suit size of equipment furnished, with height as shown on construction documents, but not less than 203 mm (8 inches) above roof surface.
- I. Top of Equipment Supports: Level with pitch built into curb when deck slopes. Equip supports with water diverter or cricket on side that obstructs water flow.

2.4 LOW SILHOUETTE GRAVITY VENTILATORS

- A. Fabricate base of 1 mm (0.04 inch) thick aluminum, and vent of 0.8 mm (0.032 inch) thick aluminum.
 - 1. Height not to exceed 305 mm (12 inches) above top of roof curb.
 - 2. Design ventilators to withstand 137 Km (85 miles) per hour wind velocity.
 - 3. Provide ventilators with a removable 18 by 18 mesh by 0.28 mm (0.11 inch) diameter aluminum wire cloth insect screen.
 - 4. Provide security grille where indicated on construction documents.
- B. Construct damper of the same material as the ventilator and design to completely close opening or remain wide open. Hold damper in closed position by a brass chain and catch. Extend chains 305 mm (12 inches) below and engage catch when damper is closed.

2.5 METAL GRATING ROOF WALKWAY SYSTEM: (NOT USED)

2.6 FINISH:

- A. In accordance with NAAMM AMP 500 Series.
- B. Aluminum, Mill Finish: AA-MIX, as fabricated.
- C. Aluminum, Clear Finish AAMA 611: AA-M12C22A41 medium matte, clear anodic coating.

- D. Aluminum Colored Finish AAMA 611: AA-C22A42 (anodized or AA-M12C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating. Dyes will not be accepted.
- E. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 0.04 mm (1.5 mils). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- F. Fluoropolymer Finish: High performance organic coating. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 - 1. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install roof specialties where indicated on construction documents.
- B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise.
- C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.
- D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions require sealant.
- E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
 - 1. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
 - 2. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 610 mm (24 inches) on center.
 - 3. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 101 mm (4 inches).
- F. Equipment Supports: Do not anchor to insulating concrete or metal deck. Anchor only to building structure as per manufacturers recommendations.

3.2 PROTECTION OF ALUMINUM:

- A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.
- B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING:

- A. Adjust roof hatch hardware to operate freely and so that cover will operate without binding, close tightly at perimeter, and latch securely.

3.4 PROTECTION:

- A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies spray-applied mineral fiber and cementitious coverings to provide fire resistance to interior structural steel members shown.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Testing laboratory accreditations.
- E. Manufacturer's Literature and Data:
 - 1. Manufacturer's complete and detailed application instructions and specifications.
 - 2. Manufacturer's repair and patching instructions.
- F. Certificates:
 - 1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
 - a. List thickness and density of material required to meet fire ratings.
 - b. Accompanied by complete test report and test record.
 - 2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.
- G. Miscellaneous:
 - 1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
 - 2. Manufacturer's written approval of completed installation.
 - 3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and UL certification markings of compliance with the specified requirements.
- B. Remove damaged or opened containers from the site.
- C. Store the materials off the ground, under cover, away from damp surfaces.
- D. Keep dry until ready for use.
- E. Remove materials that have been exposed to water before installation from the site.

1.4 FIELD CONDITIONS:

- A. Temperature: Do not apply fireproofing when substrate or ambient temperature is below 4 degrees C (40 degrees F) unless temporary protection and heat are provided to maintain temperature at or above stated value during application and for 24 hours before and after application.
- B. Humidity: Maintain relative humidity levels within limits recommended by fireproofing manufacturer.
- C. Ventilation: Provide ventilation to properly dry the fireproofing after application. Provide a minimum of four (4) air exchanges per hour by forced air circulation. When permitted by Contracting Officer Representative (COR), ventilate by natural circulation.

1.5 QUALITY ASSURANCE:

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. Submit manufacturer's certification that each installer is trained and qualified to install the specified fireproofing. Submit evidence that each installer has a minimum of three (3) years' experience and a minimum of four (4) installations using the specified fireproofing.
- B. Testing Laboratory Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority. Submit a copy of the Certificate of Accreditation and Scope of Accreditation.
- C. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

- D. Manufacturer's inspection and approval of surfaces to receive fireproofing.
- E. Manufacturer's approval of fireproofing applications.
- F. Manufacturer's approval of completed installation.
- G. Manufacturer's representative is to observe and advise at the commencement of application, and is required to visit the site as required thereafter for the purpose of ascertaining proper application.
- H. Pre-Application Test Area.
 - 1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
 - a. Apply to one (1) column.
 - b. Apply for the hourly ratings required in the construction documents.
 - 2. Install in location selected by the COR, for approval by the representative of the fireproofing material manufacturer and the COR.
 - 3. Perform Bond test for cohesive and adhesive strength in accordance with ASTM E736 for each applied fireproofing design used.
 - 4. Perform density test in accordance with ASTM E736 for each applied fireproofing design used.
 - 5. Do not proceed in other areas until installation of test area has been completed and approved.
 - 6. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - C841-03(R2013).....Installation of Interior Lathing and Furring
 - C847-14.....Metal Lath
 - D2240-05(R2010).....Test Method for Rubber Property - Durometer Hardness
 - E84-14.....Surface Burning Characteristics of Building Materials
 - E119-12a.....Fire Tests of Building Construction and Materials

- E605-93 (R2011).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members
- E736-00 (R2011).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- E759-92 (R2011).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
- E760-92 (R2011).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
- E761-92 (R2011).....Compressive Strength of Fire-Resistive Material Applied to Structural Members
- E859-93 (R2011).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members
- E937-93 (R2011).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members
- E1042-02 (R2014).....Acoustically, Absorptive Materials Applied by Trowel or Spray.
- G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi
- C. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory...Latest Edition including Supplements
- D. Warnock Hersey (WH):
Certification Listings..Latest Edition
- E. Factory Mutual System (FM):
Approval Guide.....Latest Edition including Supplements
- F. Environmental Protection Agency (EPA):
40 CFR 59 (2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SPRAYED-ON FIREPROOFING:

- A. ASTM E1042, Class (a), Category A.
 - 1. Type I, factory mixed cementitious materials with approved aggregate.
 - 2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 240 kg per cubic meter (15 lb. per cubic feet) density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

- B. Materials containing asbestos are not permitted.
- C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

| | Characteristic | Test | Results |
|----|-----------------------------------|-----------|--|
| 1. | Deflection | ASTM E759 | No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3 m (10 ft.) |
| 2. | Corrosion-Resistance | ASTM E937 | No promotion of corrosion of steel. |
| 3. | Bond Impact | ASTM E760 | No cracking, spalling, or delamination. |
| 4. | Cohesion/Adhesion (Bond Strength) | ASTM E736 | Minimum cohesive/adhesive strength of 9.57 kPa (200 lbf per sq. ft.) for protected areas. 19.15 kPa (400 lbf per sq. ft.) for exposed areas. |
| 5. | Air Erosion | ASTM E859 | Maximum gain weight of the collecting filter 0.27 gm per sq. meter (0.025 gm per sq. ft.). |

| | | | |
|----|--|-----------|--|
| 6. | Compressive Strength | ASTM E761 | Minimum compressive strength 48 kPa (1000 psf). |
| 7. | Surface Burning Characteristics with adhesive and sealer to be used | ASTM E84 | Flame spread 25 or less smoke developed 50 or less |
| 8. | Fungi Resistance | ASTM G21 | Resistance to mold growth when inoculated with aspergillus niger (28 days for general application) |

2.2 ADHESIVE:

- A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.
- B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER:

- A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.
- B. Surface burning characteristics as specified for fireproofing material.
- C. Fungus resistant.
- D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.
- E. VOC content: Product to comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, (EPA Method 24):
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.

2.4 WATER:

- A. Clean, fresh, and free from organic and mineral impurities.
- B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL:

- A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg per square meter (1.7 pounds per square yard) or as required, according to fire-resistance designs indicated and fire proofing manufacturer's written instructions.
- B. Fasteners: ASTM C841.

- C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachments.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.
- B. Verify hangers, inserts and clips are installed before the application of fireproofing material.
- C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.
- D. Verify concrete work on steel decking and concrete encased steel is completed.
- E. When applied in conjunction with roof structures or roof decks, verify that roofing, installation of rooftop HVAC equipment, and other related work are complete.
- F. Verify temperature and enclosure conditions required by fire-proofing material manufacturer.
- G. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond. Submit test report.

3.2 APPLICATION:

- A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.
- B. Coordinate application of fireproofing material with other trades.
- C. Cover other work and exterior openings subject to damage from fallout or overspray of fireproofing materials during application.
- D. Application of Metal Lath:
 - 1. Apply to beam and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
 - 2. Apply to beam flanges 305 mm (12-inches) or more in width.
 - 3. Apply to column flanges 406 mm (16-inches) or more in width.

4. Apply to beam or column web 406 mm (16-inches) or more in depth.
 5. Tack weld or mechanically fasten on maximum of 305 mm (12-inch) center.
 6. Lap and tie lath member in accordance with ASTM C841.
- E. Mix and apply in accordance with manufacturer's instructions.
1. Mechanically control material and water ratios.
 2. Apply adhesive and sealer, when not an integral part of the materials, in accordance with the manufacturer's instructions.
 3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
 4. Minimum ASTM E605 applied dry density per cubic meter (cubic foot) for the underside of the walk on deck (interstitial) hung purlin or beam and steel deck, columns in interstitial spaces and mechanical equipment rooms to be as follows:
 - a. Type I - 350 kg per cubic meter (22 lb. per cubic ft.).
 - b. Type II - 240 kg per cubic meter (15 lb. per cubic ft.).
 - c. Provide materials with higher density of 640 kg per cubic metric (40 lb. per cubic feet) in mechanical rooms and parking garages.
- F. Complete application is to be completed in one area. Inspection and approval by COR is required before removal of application equipment and proceeding with further work.

3.3 FIELD TESTS:

- A. The applied fireproofing to be tested by a COR approved independent testing laboratory and paid for by the Contractor. Submit test reports documenting results of tests on the applied material in the project.
- B. COR will select area to be tested in specific bays on each floor using a geometric grid pattern. Apply test sample every 929 square meters (10,000 square feet) of floor area or two (2) for each floor, whichever produces the greatest number of test areas.
- C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test are not acceptable.
- D. Areas showing less than required fireproofing characteristics are not suitable for the following field tests.
 1. Test for cohesion/adhesion: ASTM E736.
 2. Test for bond impact strength: ASTM E760.

3.4 PATCHING AND REPAIRING:

- A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.
- B. Perform corrective measures in accordance with fireproofing material manufacturer's recommendations.
 - 1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
 - 2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
 - 3. Do not hand mix material.
- C. Repair:
 - 1. Respray test and rejected areas.
 - 2. Patch fireproofing material which is removed or disturbed after approval.
- D. Perform final inspection of sprayed areas after patching and repair.

3.6 SCHEDULE:

- A. Apply fireproofing material in interior structural steel members, except on following surfaces:
 - 1. Structural steel and underside of steel decks in elevator or dumbwaiter machine rooms.
 - 2. Steel members in elevator hoist ways.
 - 3. Areas used as air handling plenums.
 - 4. Steel to be encased in concrete or designated to receive other type of fireproofing.

| Fire Rating Schedule | | | |
|----------------------|--|---------------|---------------------|
| Type | Element | Hourly Rating | UL Design Reference |
| ___ | Columns supporting one floor | ___ | ___ |
| ___ | Columns supporting more than one floor | ___ | ___ |
| ___ | Columns supporting roof | ___ | ___ |
| ___ | Floor decks | ___ | ___ |
| ___ | Floor supports | ___ | ___ |
| ___ | Roof decks | ___ | ___ |
| ___ | Roof supports | ___ | ___ |

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SECTION 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
- B. Provide UL or equivalent approved firestopping system for the closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- C. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING
- D. Sealants and application: Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Inspector qualifications.
- E. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- F. List of FM, UL, or WH classification number of systems installed.
- G. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.
- H. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

1.4 DELIVERY AND STORAGE:

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

1.5 QUALITY ASSURANCE:

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.
- B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.
- C. Inspector Qualifications: Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - E84-14.....Surface Burning Characteristics of Building Materials
 - E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
 - E814-13a.....Fire Tests of Through-Penetration Fire Stops
 - E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops
 - E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- C. FM Global (FM):
 - Annual Issue Approval Guide Building Materials
 - 4991-13.....Approval of Firestop Contractors
- D. Underwriters Laboratories, Inc. (UL):
 - Annual Issue Building Materials Directory
 - Annual Issue Fire Resistance Directory

723-10(2008).....Standard for Test for Surface Burning
Characteristics of Building Materials

1479-04(R2014).....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):
Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):

40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

- A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 in.) nominal pipe or 0.01 sq. m (16 sq. in.) in overall cross sectional area.
- C. Firestop sealants used for firestopping or smoke sealing to have the following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Release no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
 - 5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.

- D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:
 - 1. Classified for use with the particular type of penetrating material used.
 - 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.
- F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- G. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.
- H. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 101 mm (4 in.) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS:

- A. Provide silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Provide mineral fiber filler and bond breaker behind sealant.
- C. Sealants to have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with ASTM E84.

- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Submit product data and installation instructions, as required by article, submittals, after an on-site examination of areas to receive firestopping.
- B. Examine substrates and conditions with installer present for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.
- C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

- A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP:

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Clean up spills of liquid type materials.
- C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

- A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).
- B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and type of firestopping used at each location; type is to be recorded by UL listed printed numbers.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. D. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.
- B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
 - 4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Lab Tests: Submit samples of materials that will be in contact or affect joint sealants to joint sealant manufacturers for tests as follows:

1. Adhesion Testing: Before installing elastomeric sealants, test their adhesion to protect joint substrates according to the method in ASTM C794 to determine if primer or other specific joint preparation techniques are required.
2. Compatibility Testing: Before installing elastomeric sealants, determine compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Perform testing per ASTM C1248 on interior and exterior sealants to determine if sealants or primers will stain adjacent surfaces. No sealant work is to start until results of these tests have been submitted to the Contracting Officer Representative (COR) and the COR has given written approval to proceed with the work.
2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of non-elastomeric sealant and joint substrate indicated.
3. Notify COR seven (7) days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.

1.4 CERTIFICATION:

- A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.

G. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

H. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
 - b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.8 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Backing Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.9 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".

- B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

- B. ASTM International (ASTM):

- C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material
- C612-14.....Mineral Fiber Block and Board Thermal Insulation
- C717-14a.....Standard Terminology of Building Seals and Sealants
- C734-06 (R2012).....Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering
- C794-10.....Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
- C919-12.....Use of Sealants in Acoustical Applications.
- C920-14a.....Elastomeric Joint Sealants.
- C1021-08 (R2014).....Laboratories Engaged in Testing of Building Sealants
- C1193-13.....Standard Guide for Use of Joint Sealants.
- C1248-08 (R2012).....Test Method for Staining of Porous Substrate by Joint Sealants
- C1330-02 (R2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
- C1521-13.....Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
- D217-10.....Test Methods for Cone Penetration of Lubricating Grease
- D412-06a (R2013).....Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
- D1056-14.....Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
- E84-09.....Surface Burning Characteristics of Building Materials

- C. Sealant, Waterproofing and Restoration Institute (SWRI).

The Professionals' Guide

D. Environmental Protection Agency (EPA):

40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. Provide location(s) of exterior sealant as follows:

- a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
- b. Metal to metal.
- c. Masonry to masonry or stone.
- d. Stone to stone.
- e. Cast stone to cast stone.
- f. Masonry expansion and control joints.
- g. Wood to masonry.
- h. Masonry joints where shelf angles occur.
- i. Voids where items penetrate exterior walls.
- j. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

2.2 COLOR:

- A. Sealants used with exposed masonry are to match color of mortar joints.
- B. Sealants used with unpainted concrete are to match color of adjacent concrete.
- C. Color of sealants for other locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.

- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 WEEPS:

- A. Weep/Vent Products: Provide the following unless otherwise indicated or approved.
 - 1. Round Plastic Tubing: Medium-density polyethylene, 10 mm (3/8-inch) OD by thickness of stone or masonry veneer.

2.5 FILLER:

- A. Mineral fiberboard: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.7 CLEANERS-NON POROUS SURFACES:

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
 - a. Concrete.
 - b. 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. Nonporous surfaces include but are not limited to the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
 - 1. Apply primer prior to installation of back-up rod or bond breaker tape.

2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 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 degrees C and 38 degrees C (40 degrees and 100 degrees F).
 2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
 3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 5. Avoid dropping or smearing compound on adjacent surfaces.
 6. Fill joints solidly with compound and finish compound smooth.
 7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant

and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.

8. Finish paving or floor joints flush unless joint is otherwise detailed.
 9. Apply compounds with nozzle size to fit joint width.
 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
 11. Replace sealant which is damaged during construction process.
- B. Weeps: Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, at all flashing, and as indicated on construction documents.
1. Use round plastic tubing to form weep holes.
 2. Space weep holes formed from plastic tubing not more than 406 mm (16 inches) o.c.
 3. Trim tubing material used in weep holes flush with exterior wall face after sealant has set.
- C. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.
- D. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
 4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
 5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for first 305 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 305 m (1000 feet) of joint length thereafter or one test per each floor per elevation.
- B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
- C. Inspect tested joints and report on following:
 - 1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 2. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 3. Whether sealants filled joint cavities and are free from voids.
 - 4. Whether sealant dimensions and configurations comply with specified requirements.
- D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
- E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with

other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.7 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated floor, wall, and ceiling seismic and building expansion joint assemblies.
 - a. Metal plate covers at floor, wall and ceiling joints.
 - b. Elastomeric joint covers at wall and ceiling joints.
 - c. Preformed elastomeric sealant joint at interior, floor and wall control joints.
 - d. Exterior wall joints.

1.2 RELATED REQUIREMENTS

- A. Sheet Metal Expansion Joint Seals: Section 07 60 00, FLASHING AND SHEET METAL.
- B. Roof Expansion Joint Cover Assemblies: Section 07 72 00, ROOF ACCESSORIES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this Section.
- B. American Society of Civil Engineers (ASCE):
 1. ASCE/SEI 7-10 - Minimum Design Loads For Buildings and Other Structures.
- C. ASTM International (ASTM):
 1. A36/A36M-14 - Structural Steel.
 2. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
 3. A283/A283M-13 - Low and Intermediate Tensile Strength Carbon Steel Plates.
 4. A786/A786M-05(2009) - Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
 5. B36/B36M-13 - Brass, Plate, Sheet, Strip, and Rolled Bar.
 6. B121/B121M-11 - Leaded Brass Plate, Sheet, Strip and Rolled Bar.
 7. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 8. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 9. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

10. B221M 13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 11. B455-10 - Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.
 12. C864-05(2011) - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 13. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 14. E1399/E1399M-97(2013)e1 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
 15. E1966-15 - Standard Test Method for Fire-Resistive Joint Systems.
- D. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-06 - Metal Finishes Manual.
- E. UL LLC (UL):
1. 2079-15 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this Section.
1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Inspection and Testing Agency.
 - c. Contractor.
 - d. Installer.
 - e. Manufacturer's field representative.
 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Other items affecting successful completion.
 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Include large-scale details indicating profiles of each type of expansion joint cover, splice joints between joint sections, transitions to other assemblies, terminations, anchorages, fasteners, and relationship to adjoining work and finishes.
 - 2. Show size, configuration, and fabrication and installation details.
 - 3. Include composite drawings showing work specified in other Sections coordinated with expansion joints.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product specified.
 - 2. Show movement capability of each cover assembly and suitability of material used in exterior seals for ultraviolet exposure.
 - 3. Description of materials and finishes.
 - 4. Installation instructions.
- D. Samples: Submit 300 mm (12 inch) long samples.
 - 1. Each type and color of metal finish for each required thickness and alloy.
 - 2. Each type and color of flexible seal.
- E. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 - 2. Low Pollutant-Emitting Materials:
 - a. Identify volatile organic compound types and quantities.
- F. Qualifications: Substantiate qualifications comply with specifications.
- G. Certificates: Indicate products comply with specifications.
 - 1. Fire rated expansion joint cover assemblies.
- H. Operation and Maintenance Data:
 - 1. Care instructions for each exposed finish product.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Regularly installs specified products.
 - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.8 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting expansion joint cover assembly fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.10 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Provide joint cover assemblies that permit unrestrained movement of joint without disengagement of cover, and, where applicable, maintain moisture, watertight and fire-rated protection.
- B. Provide templates to related trades for location of support and anchorage items.

2.2 SYSTEM PERFORMANCE

- A. Design expansion joint cover assemblies complying with specified performance.
- B. Joint Movement: ASTM E1399.
 - 1. Nominal Joint Width:
 - 2. Minimum Movement Capability: 25 percent.
 - 3. Movement Type: Thermal and wind and seismic.
- C. Floor Joints: Live loads, including rolling loads.

1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
2. Maximum Deflection: 1/360 of span, maximum.
- D. Fire Rated Joints: ASTM E1399, ASTM E1966, or UL 2079, including hose stream test at full-rated period.
 1. Fire rating: Match adjacent floor, wall, and ceiling construction.
 2. System: Capable of anticipated movement while maintaining fire rating.
 3. Coverless Applications: Maintain fire rating without joint cover system.

2.3 MATERIALS

- A. Stainless Steel: ASTM A240/A240M, Type 302 or 304.
- B. Structural Steel Shapes: ASTM A36/A36M.
- C. Steel Plate: ASTM A283/A283M, Grade C.
- D. Rolled Steel Floor Plate: ASTM A786/A786M.
- E. Aluminum:
 1. Extruded: ASTM B221M (ASTM B221), alloy 6063-T5, 6063-T6, or 6061-T6.
 2. Plate and Sheet: ASTM B209M (ASTM B209), alloy 6061-T6.
- F. Bronze: Manufacturer's standard alloy.
 1. Extruded: ASTM B455.
 2. Plate: ASTM B121.
- G. Brass: ASTM B36/B36M.
- H. Elastomeric Sealant: As specified in Section 07 92 00, JOINT SEALANTS.
- I. Elastomeric Seals:
 1. Flexible extruded polyvinyl chloride, meeting a Shore A hardness of 75 with UV stabilizer. Manufacturer's standard colors.
- J. Thermoplastic Rubber:
 1. ASTM C864.
 2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.
- K. Compression Seals: Pre-compressed secondary sealant using preformed expanding foam sealant; open-cell polyurethane foam impregnated with polymer-modified acrylic adhesive.
- L. Water Barrier Sheets: Neoprene or EPDM flexible sheet materials minimum 45 mils thick.
 1. Provide with drain tubes for horizontal applications.

- M. Vinyl Invertor Sealant Waterstops: Manufacturer's standard shapes and grade.
- N. Moisture Barrier: Fabric reinforced clear vinyl sheet material sized to accommodate opening.
- O. Flexible Membrane: 1.5 mm (60 mil) EPDM sheet, with manufacturer's standard support foam.
- P. Fire Barrier: Labeled by an approved independent testing laboratory for fire resistance ratings indicated for maximum joint width.
 - a. Thermal Insulation: Manufacturer's standard with factory cut miters and transitions.
 - b. Fire Barrier Lengths:
 - 1) Joint widths up to and including 150 mm (6 inches): Maximum 15 m (50 feet) to minimize field splicing.
 - 2) Other Joint widths: 3 m (10 foot) with overlapping ends for field splicing.
- Q. Ceramic Blanket: Manufacturer's standard joint filler to achieve fire rating indicated.
- R. Butyl Caulk Tape: Self adhering double sided butyl rubber sealant tape with easy-release silicone coated paper.

2.4 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.
 - 1. Provide ceiling and wall expansion joint cover assemblies design matching floor to wall and floor to floor expansion joint cover design.
 - 2. Provide expansion joint cover assembly designs, profiles, materials and configuration indicated, as required to accommodate joint size variations in adjacent surfaces, and anticipated movement.
- B. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 2. Stainless Steel Recycled Content: 70 percent total recycled content, minimum.
 - 3. Aluminum Recycled Content: 80 percent total recycled content, minimum.
 - 4. Low Pollutant-Emitting Materials: Maximum VOC content by weight.
 - a. Non-Flooring Adhesives and Sealants.

2.5 FABRICATION

- A. Fabricate Expansion Joint Cover Assemblies:

1. As complete assembly ready for installation.
 2. In longest practicable lengths to minimize number of end joints.
 3. With factory mitered corners where joint changes directions or abuts other materials.
 - a. With closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
 4. Joints within enclosed spaces such as chase walls, include 1 mm (0.04 inch) thick galvanized steel cover where conventional expansion joint cover is not used.
 5. Where floor slab is fire rated provide ceramic blanket at joints.
 6. Seal Strip: Factory-formed and bonded to metal frames and anchor members.
 7. Compression Seals: Fabricate from expanding foam as secondary seal and elastomeric sealant to sizes and profiles shown.
- B. Floor-to-Floor Metal Plate Joints:
1. Frames: Metal, continuous on both sides of joint designed to support cover plate.
 - a. Flush Design: Seating surface and raised floor rim to accommodate adjacent flooring.
 - b. Anchorage: Concealed bolt and steel anchors for embedment in concrete.
 2. Cover Plate: Metal, matching frames where exposed.
 - a. Supported Load: 19.2 MPa (400 psf), minimum.
 - b. Rattle-free due to traffic.
 3. Fillers: Resilient material between raised rim of frame and edge of cover plate, where shown.
 - a. No gaps or bulges over full design range joint movement.
 4. Fire Barrier: As required for fire resistance rating.
 5. Water Stop: Manufacturer's standard, continuous, full length of joint.
 6. Seismic: As required by Code.
- C. Floor-to-Wall Metal Plate Joints:
1. Frames: Metal, continuous on floor side of joint only.
 - a. Provide wall side frame where required by manufacturer's design.
 2. Cover Plates: Angle cover plates with countersunk flat-head exposed fasteners for securing cover plate to wall unless shown otherwise.
 - a. Fastener Spacing: As recommended by manufacturer.
 3. Joint Design: Match adjacent floor to floor design.

4. Fire Barrier: As required for fire resistance rating.
 5. Water Stop: Manufacturer's standard, continuous, full length of joint.
 6. Seismic: As required by Code.
- D. Interior Wall Joint Cover Assemblies:
1. Frame: Metal, surface mounted, concealed fastening to wall on one sides of joint.
 2. Cover Plate: Metal, smooth surface, lap both sides of joint and permitting free movement on one side.
 - a. Fabricate with concealed attachment of cover to frame when cover is in close contact with adjacent wall surface finish.
 - b. Use angle cover plates at intersecting walls.
 3. Joint Design: Match adjacent floor to floor design.
 4. Fire Barrier: As required for fire resistance rating.
 5. Seismic: As required by Code.
- E. Exterior Wall Joint Assemblies:
1. Design seal for variable movement and prevention of water and air infiltration.
 2. Frame: Metal, concealed, for fastening to wall on one side of joint.
 3. Cover Plate: Metal, surface mounted, lap both sides of joint, permitting free movement on one side.
 - a. Fabricate with concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
 - b. Use angle cover plate at intersecting walls.
 4. Water Seal: Vinyl seal strip as secondary seal behind primary seal.
 5. Seismic: As required by Code.
- F. Extruded Thermoplastic Rubber Joint Assemblies:
1. Frames: Aluminum, both sides of joint.
 2. Primary Seal: Flexible rubber on exposed face after frame installation with factory welded watertight miters and transitions.
 - a. Anchor spaced at ends and not over 600 mm (24 inches).
 - 1) Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint.
 - b. Flush mounted seal minimum 3 mm (0.12 inch) thick with dual movement grooves designed for plus or minus 50 percent, movement of joint width.

- c. Seismic seal minimum 3 mm (0.12 inch) thick with multi-movement grooves designed for plus or minus 100 percent movement of joint width.
 - d. Recessed front face seal minimum 3 mm (0.12 inch) thick with no movement grooves, designed for plus or minus 50 percent movement of joint width.
 - e. Provide pantographic wind load supports, maximum 2400 mm (8 feet) on center to support seal systems of 300 mm (12 inches) wide and greater.
3. Secondary Seal: Continuous vinyl sheet seal.
- G. Ceiling and Soffit Assemblies:
- 1. Frames: Metal, continuous on both sides of joint, flush mounted with no exposed fasteners.
 - 2. Flexible Insert: Variable movement semi-rigid vinyl locked into frame.
 - a. Face Style: Flush or accordion, as shown, to span joint width without sagging.
 - 3. Seismic: As required by Code.
- H. Garage Floor Joint Cover Plate:
- 1. Frame: Angle edge frame on both sides of joint, size as shown.
 - a. Anchors: Stud bolts minimum 100 mm (4 inches) long and 10 mm (3/8 inch) diameter welded to angle spaced maximum 600 mm (24 inches) on center.
 - b. Drill and top one frame for cover plate fasteners.
 - 2. Cover Plate: Aluminum or steel cover plate minimum 10 mm (3/8 inch) thick with edges beveled, smooth finish, drilled for countersunk fasteners at ends and maximum 600 mm (24 inches) on center.
 - 3. Seismic: As required by Code.
- I. Preformed Sealant Joint: Factory installed elastomeric sealant between extruded aluminum angle frame both sides.
- 1. Frames: Extruded aluminum angle on both sides of joint.
 - 2. Filler: Elastomeric sealant.
 - 3. Anticipated movement: 25 percent maximum.

2.6 FINISHES

- A. Carbon Steel: NAAMM AMP 500, Galvanized G90.
- B. Stainless Steel: NAAMM AMP 500, No. 2B bright finish.
- C. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
 2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.
- D. Aluminum Paint Finish:
1. Fluorocarbon Finish: AAMA 2605; 70 percent fluoropolymer resin, 2-coat system.
 2. Fluorocarbon Finish: AAMA 605; 70 percent fluoropolymer resin, 2-coat system.
- E. Bronze Finish: NAAMM-AMP 500, M32 mechanical finish, directional textured, natural medium satin.

2.7 ACCESSORIES

- A. General: Manufacturer's standard anchors, fasteners, set screws, spaces, protective coating, and filler materials, adhesive and other accessories required for installation.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.
- D. Fasteners: Type and size recommended by expansion joint cover assembly manufacturer.
 1. Exterior Applications: Stainless steel.
 2. Fasteners for Aluminum: Stainless steel.
 3. Other Applications: Galvanized steel or stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 1. Provide items embedded in concrete and masonry in time for building into work without delaying work.
- B. Protect existing construction and completed work from damage.
- C. Apply barrier coating to aluminum and steel surfaces in contact with dissimilar metals and cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install anchorage devices and fasteners for securing expansion joint assemblies to in-place construction where anchors are not embedded in concrete and masonry.
 1. Secure with metal fasteners, type and size to suit application.
- C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.
- D. Install joint cover assemblies aligned and positioned in correct relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.
 1. Allow for thermal expansion and contraction of metal to avoid buckling.
 2. Accommodate joint opening size at time of installation.
- E. Set floor covers at elevations flush with adjacent finished flooring, unless shown otherwise.
- F. Grout floor frames set in prepared recesses.
- G. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Secure with required accessories.
- H. Locate anchors at interval recommended by manufacturer, but minimum 75 mm (3 inches) from each end, and, maximum 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 accommodate thermal expansion and contraction of metal to avoid buckling of frames and cover plates.
- K. Flush Metal Cover Plates:
 1. Secure flexible filler between frames to allow compression and expansion.
 2. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- L. Waterstops:
 1. Install in conjunction with floor joints, and where shown.
 2. Install continuously to prevent water damage to finish spaces.
 3. Seal waterstop to frames to prevent water leakage.

4. Install drainage tubes from waterstops to discharge collected water in nearest plumbing air gap drain.

M. Fire Barriers:

1. Install in compliance with tested assembly.
2. Install at joints in floors and in fire rated walls.
3. Use fire barrier sealant furnished with expansion joint assembly.

N. Apply sealant where required to prevent water and air infiltration.

O. Vertical Exterior Extruded Thermoplastic Rubber.

1. Install side frames mounted on sealant or butyl caulk tape with appropriate anchors 600 mm (24 inches) on center complete with secondary seal.
2. Install primary seals retained in extruded aluminum side frames.

P. Extruded Thermoplastic Rubber or Seals:

1. For straight sections, install preformed seals in continuous lengths.
2. Vulcanize or heat-seal field spliced joints to provide watertight joints as recommended by manufacturer.

Q. Preformed Elastomeric Sealant Joint:

1. Locate joint directly over joints in wall and floor substrates.
2. Fasten full length to substrate using construction adhesive.
3. Install flush or slightly below finish material.

3.3 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed metal surfaces. Remove contaminants and stains.

3.4 PROTECTION

- A. Cover floor joints with plywood where wheel traffic occurs before Substantial completion.
- B. Remove protective covering when adjacent work areas are completed. Clean exposed surfaces in compliance with manufacture's printed instructions.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and panels installed in walls and ceilings.

1.2 RELATED REQUIREMENTS (NOT USED)

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. American Welding Society (AWS):

1. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.

C. ASTM International (ASTM):

1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Sip Process.
2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
3. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel sheet, Strip, Plate, and Flat Bar.
4. E119-15 - Fire Test of Building Construction and Materials.

D. National Fire Protection Association (NFPA):

1. 80-16 - Fire Doors and Other Opening Protectives.
2. 251-12 - Fire Tests of Door Assemblies.

E. National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

F. UL LLC (UL):

1. Listed - Online Certifications Directory.
2. 10B-08 - Standard for Fire Tests of Door Assemblies.
3. 263-11 - Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.

2. Installation instructions.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

1.5 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting access door fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Sheet: ASTM A1008/A1008M.
- B. Galvanized Steel: ASTM A 653/A 653M.
- C. Stainless Steel: ASTM A666; Type 302 or Type 304.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.
- B. Sustainable Construction Requirements:
 - 1. Steel Access Doors Recycled Content: 30 percent total recycled content, minimum.
 - 2. Stainless Steel Access Doors Recycled Content: 70 percent total recycled content, minimum.

2.3 ACCESS DOORS, FIRE-RATED

- A. Door Construction:
 - 1. Ceiling Access Door Construction: ASTM E119 or UL 263.
 - 2. Wall Access Doors: NFPA 252 or UL 10B.
- B. Label: Class B opening according to UL 10B or test by another nationally recognized laboratory. 1 hour fire-rated, with maximum temperature rise of 120 degrees C (216 degrees F).
- C. Door Panel: Minimum 0.9 mm (0.0359 inch) thick stainless steel sheet, with mineral-fiber insulation core, insulated sandwich type construction.
- D. Frame: Minimum 1.5 mm (0.0598 inch) thick steel sheet, depth and configuration to suit material and construction type where installed.
 - 1. Frame Flange: Provide at units installed in concrete, masonry, or gypsum board.
 - 2. Exposed Joints in Flange: Weld and grind smooth.
- E. Provide self closing device.
- F. Hinge: Continuous stainless steel hinge with stainless steel pin.
- G. Lock: Self-latching, mortise type with provision for fitting flush a standard screw-in type lock cylinder.
 - 1. Latch release device operable from inside of door.
- H. Anchors for Fire-Rated Access Doors: Comply with requirements of applicable fire test.

2.4 ACCESS DOORS, FLUSH PANEL, NON-RATED

- A. Door Panel:
 - 1. 1.9 mm (0.07 inch) thick steel thick stainless steel sheet.
 - 2. Reinforce to maintain flat surface.
- B. Frame:
 - 1. 1.5 mm (0.06 inch) thick stainless steel sheet, depth and configuration to suit material and construction type where installed.
 - 2. Frame Flange: Provide at units installed in concrete, masonry, and gypsum board.
 - 3. Exposed Joints in Flange: Weld and grind smooth.
- C. Hinge:
 - 1. Concealed spring hinge, 175 degrees of opening.
 - 2. Removable hinge pin to allow removal of door panel from frame.
- D. Lock:

1. Flush, screwdriver-operated cam lock.

2.5 ACCESS DOOR, RECESSED PANEL, NON-RATED

A. Door Panel:

1. 1.2 mm (0.05 inch) thick stainless steel sheet to form a 25 mm (1 inch) deep recessed pan to accommodate installation of acoustical units and other materials where shown in walls and ceiling.
2. Reinforce to prevent sagging.

B. Frame:

1. 1.5 mm (0.06 inch) thick steel sheet of depth and configuration to suit installation in suspension system of ceiling or wall framing.
2. Extend sides of frame to protect edge of acoustical units when door panel is in open position.
3. Provide shims, bushings, clips and other devices necessary for installation.

C. Hinge: Continuous stainless steel hinge with stainless steel pin, or concealed hinge.

D. Lock:

1. Flush screwdriver-operated cam lock.
2. Plastic sleeve or stainless steel grommet to protect hole made in acoustical unit for screwdriver access to lock.

2.6 FABRICATION - GENERAL

A. Size: Minimum 600 mm (24 inches) square door unless otherwise shown or required to suit opening in suspension system of ceiling.

B. Component Fabrication: Straight, square, flat and in same plane where required.

1. Exposed Edges: Slightly rounded, without burrs, snags and sharp edges.
2. Exposed Welds: Continuous, ground smooth.
3. Welding: AWS D1.3/D1.3M.

C. Locks and Non-Continuous Hinges: Provide in numbers required to maintain alignment of door panel with frame. For fire-rated doors, provide hinges and locks as required by fire test.

D. Anchoring: Make provisions in frame for anchoring to adjacent construction. Provide anchors in size, number and location on four sides to secure access door to substrate. Provide anchors as required by fire test.

2.7 FINISHES

- A. Steel Paint Finish:
 - 1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
 - a. One coat primer.
 - b. One coat thermosetting topcoat.
 - c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
- B. Stainless Steel Exposed Surfaces: NAAMM AMP 500; No. 4 polished finish.

2.8 ACCESSORIES

- A. Fasteners: Type and size recommended by access door manufacturer, to suit application.
 - 1. Stainless Steel Access Doors: Stainless steel fasteners.
 - 2. Other Access Doors: Stainless steel fasteners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify access door locations and sizes provide required maintenance access to installed building services components.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical and conveyor control items concealed in walls and partitions, and concealed above gypsum board and plaster ceilings.
- C. Install fire rated access door according to NFPA 80.
- D. Install fire-rated doors in fire-rated partitions and ceilings.

3.3 ACCESS DOOR AND FRAME INSTALLATION

- A. Wall Installations: Install access doors in openings with sides vertical.
- B. Ceiling Installations: Install access doors parallel to ceiling suspension grid or room partitions.

- C. Frames without Flanges: Install frame flush with surrounding finish surfaces.
- D. Frames with Flanges: Overlap opening, with face uniformly spaced from finish surface.
- E. Recessed Panel Access Doors: Install with face of surrounding materials flush with door panel installed finish.
- F. Secure frames to adjacent construction with fasteners.
- G. Install type, size and quantity of anchoring device suitable for material surrounding opening to maintain alignment, and resist displacement, during normal use of access door.
- H. Field Painting Primed Access Doors: Comply with the requirements of Section 09 91 00, PAINTING.

3.4 ADJUSTMENT

- A. Adjust hardware so door panel opens freely.
- B. Adjust door when closed so door panel is centered in frame.

- - E N D - -

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK (NOT USED)

1.3 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Studs, runners and accessories.
 - 2. Hanger inserts.
 - 3. Channels (Rolled steel).
 - 4. Furring channels.
 - 5. Screws, clips and other fasteners.
- C. Shop Drawings:
 - 1. Typical ceiling suspension system.
 - 2. Typical metal stud and furring construction system including details around openings and corner details.
 - 3. Typical shaft wall assembly
 - 4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.
- D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society For Testing And Materials (ASTM)
 - A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire
 - A653/653M-11.....Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems
 - C635-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings
 - C636-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
 - C645-09.....Non-Structural Steel Framing Members
 - C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
 - C841-03 (R2008).....Installation of Interior Lathing and Furring
 - C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 - E580-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
 - 1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
 - 2. Runners same thickness as studs.

3. Exception: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use C 645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.
- E. Shaft Wall Framing:
 1. Conform to rated wall construction.
 2. C-H Studs or C-T Studs.
 3. E Studs.
 4. J Runners.
 5. Steel Jamb-Strut.

2.3 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:
 1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
 2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.
- C. "Z" Furring Channels:
 1. Not less than 0.45 mm (0.0179-inch)-thick base metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
 2. Web furring depth to suit thickness of insulation.
- D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.

- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.
- F. Tie Wire and Hanger Wire:
 - 1. ASTM A641, soft temper, Class 1 coating.
 - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- G. Attachments for Wall Furring:
 - 1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
 - 2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.
- H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 610 mm (24 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions and insulated exterior wall furring.
- G. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
 - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Fastening Studs:
 - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
 - 2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- I. Chase Wall Partitions:
 - 1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 - 2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- J. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.
- K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:
 - 1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
 - 2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
 - 3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.
- C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:
 - 1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
 - 2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
 - 3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
 - 4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
 - 5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
 - 6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.
- D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.

- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING SHAFT WALL SYSTEM

- A. Conform to UL Design No. U438 for two-hour fire rating.
- B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.
- 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.
- F. Elevator Shafts:
 - 1. Frame elevator door frames with 0.87 mm (0.0341-inch) thick J strut or J stud jambs having 75 mm (three-inch) long legs on the shaft side.
 - 2. Protrusions including fasteners other than flange of shaft wall framing system or offsets from vertical alignments more than 3 mm (1/8-inch) are not permitted unless shown.
 - 3. Align shaft walls for plumb vertical flush alignment from top to bottom of shaft.

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
 - 1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
 - 2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
- B. New exposed concrete slabs:
 - 1. Use metal inserts required for attachment and support of hangers or hanger wires with tied wire loops for embedding in concrete.

2. Furnish for installation under Division 3, CONCRETE.
 3. Suspended ceilings under concrete rib construction shall have runner channels at right angles to ribs and be supported from ribs with hangers at ends and at 1200 mm (48-inch) maximum intervals along channels. Stagger hangers at alternate channels.
- C. Concrete slabs on steel decking composite construction:
1. Use pull down tabs when available.
 2. Use power activated fasteners when direct attachment to structural framing can not be accomplished.
- D. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.
- E. Existing concrete construction exposed or concrete on steel decking:
1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.
- F. Steel decking without concrete topping:
1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
 2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.
- G. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
1. Install only for ceilings to receive screw attached gypsum board.
 2. Install in accordance with ASTM C636.
 - a. Install main runners spaced 1200 mm (48 inches) on center.
 - b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
 - c. Install wall track channel at perimeter.
- H. Installing Ceiling Bracing System:
1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
 2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure

overhead with two fasteners and to carrying channels with two fasteners or wire ties.

3.7 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- C. Level or align ceilings within 3 mm (1/8-inch.)

- - - E N D - - -

SECTION 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.
- C. Abbreviations/Acronyms:
 - 1. ABS: Acrylonitrile Butadiene Styrene
 - 2. AC: Alternating Current
 - 3. ACR: Air Conditioning and Refrigeration
 - 4. AI: Analog Input
 - 5. AISI: American Iron and Steel Institute
 - 6. AO: Analog Output
 - 7. AWG: American Wire Gauge
 - 8. BACnet: Building Automation and Control Network
 - 9. BAg: Silver-Copper-Zinc Brazing Alloy
 - 10. BAS: Building Automation System
 - 11. BCuP: Silver-Copper-Phosphorus Brazing Alloy
 - 12. BSG: Borosilicate Glass Pipe
 - 13. CDA: Copper Development Association
 - 14. C: Celsius
 - 15. CLR: Color
 - 16. CO: Carbon Monoxide
 - 17. COR: Contracting Officer's Representative
 - 18. CPVC: Chlorinated Polyvinyl Chloride
 - 19. CR: Chloroprene
 - 20. CRS: Corrosion Resistant Steel
 - 21. CWP: Cold Working Pressure
 - 22. CxA: Commissioning Agent
 - 23. db(A): Decibels (A weighted)
 - 24. DDC: Direct Digital Control
 - 25. DI: Digital Input
 - 26. DISS: Diameter Index Safety System
 - 27. DO: Digital Output
 - 28. DVD: Digital Video Disc
 - 29. DN: Diameter Nominal

30. DWV: Drainage, Waste and Vent
31. ECC: Engineering Control Center
32. EPDM: Ethylene Propylene Diene Monomer
33. EPT: Ethylene Propylene Terpolymer
34. ETO: Ethylene Oxide
35. F: Fahrenheit
36. FAR: Federal Acquisition Regulations
37. FD: Floor Drain
38. FED: Federal
39. FG: Fiberglass
40. FNPT: Female National Pipe Thread
41. FPM: Fluoroelastomer Polymer
42. GPM: Gallons Per Minute
43. HDPE: High Density Polyethylene
44. Hg: Mercury
45. HOA: Hands-Off-Automatic
46. HP: Horsepower
47. HVE: High Volume Evacuation
48. ID: Inside Diameter
49. IPS: Iron Pipe Size
50. Kg: Kilogram
51. kPa: Kilopascal
52. lb: Pound
53. L/s: Liters Per Second
54. L/min: Liters Per Minute
55. MAWP: Maximum Allowable Working Pressure
56. MAX: Maximum
57. MED: Medical
58. m: Meter
59. MFG: Manufacturer
60. mg: Milligram
61. mg/L: Milligrams per Liter
62. ml: Milliliter
63. mm: Millimeter
64. MIN: Minimum
65. NF: Oil Free Dry (Nitrogen)
66. NPTF: National Pipe Thread Female
67. NPS: Nominal Pipe Size

68. NPT: Nominal Pipe Thread
69. OD: Outside Diameter
70. OSD: Open Sight Drain
71. OS&Y: Outside Stem and Yoke
72. OXY: Oxygen
73. PBPU: Prefabricated Bedside Patient Units
74. PH: Power of Hydrogen
75. PLC: Programmable Logic Controllers
76. PP: Polypropylene
77. PPM: Parts per Million
78. PSIG: Pounds per Square Inch
79. PTFE: Polytetrafluoroethylene
80. PVC: Polyvinyl Chloride
81. PVDF: Polyvinylidene Fluoride
82. RAD: Radians
83. RO: Reverse Osmosis
84. RPM: Revolutions Per Minute
85. RTRP: Reinforced Thermosetting Resin Pipe
86. SCFM: Standard Cubic Feet Per Minute
87. SDI: Silt Density Index
88. SPEC: Specification
89. SPS: Sterile Processing Services
90. STD: Standard
91. SUS: Saybolt Universal Second
92. SWP: Steam Working Pressure
93. TEFC: Totally Enclosed Fan-Cooled
94. TFE: Tetrafluoroethylene
95. THHN: Thermoplastic High-Heat Resistant Nylon Coated Wire
96. THWN: Thermoplastic Heat & Water Resistant Nylon Coated Wire
97. T/P: Temperature and Pressure
98. USDA: U.S. Department of Agriculture
99. V: Volt
100. VAC: Vacuum
101. VA: Veterans Administration
102. VAMC: Veterans Administration Medical Center
103. VAC: Voltage in Alternating Current
104. WAGD: Waste Anesthesia Gas Disposal
105. WOG: Water, Oil, Gas

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.
- D. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- K. Section 07 60 00, FLASHING AND SHEET METAL: Flashing for Wall and Roof Penetrations.
- L. Section 07 84 00, FIRESTOPPING.
- M. Section 07 92 00, JOINT SEALANTS.

1.3 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):
 - ASME Boiler and Pressure Vessel Code -
 - BPVC Section IX-2013....Welding, Brazing, and Fusing Qualifications
 - B31.1-2012.....Power Piping
- C. American Society for Testing and Materials (ASTM):
 - A36/A36M-2012.....Standard Specification for Carbon Structural Steel
 - A575-96(R2013)e1.....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
 - E84-2013a.....Standard Test Method for Surface Burning Characteristics of Building Materials
 - E119-2012a.....Standard Test Methods for Fire Tests of Building Construction and Materials
 - F1760-01(R2011).....Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content
- D. International Code Council, (ICC):
 - IBC-2012.....International Building Code
 - IPC-2012.....International Plumbing Code
- E. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
 - SP-58-2009.....Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation

- SP-69-2003.....Pipe Hangers and Supports - Selection and Application
- F. Military Specifications (MIL):
 - P-21035B.....Paint High Zinc Dust Content, Galvanizing Repair (Metric)
- G. National Electrical Manufacturers Association (NEMA):
 - MG 1-2011.....Motors and Generators
- H. National Fire Protection Association (NFPA):
 - 51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
 - 54-2012.....National Fuel Gas Code
 - 70-2014.....National Electrical Code (NEC)
- I. NSF International (NSF):
 - 5-2012.....Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment
 - 14-2012.....Plastic Piping System Components and Related Materials
 - 61-2012.....Drinking Water System Components - Health Effects
 - 372-2011.....Drinking Water System Components - Lead Content
- J. Department of Veterans Affairs (VA):
 - PG-18-10.....Plumbing Design Manual
 - PG-18-13-2011.....Barrier Free Design Guide

1.4 SUBMITTALS

- A. Submittals, including number of required copies, 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 and will fit the space available.
- 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. Installing Contractor shall provide lists of previous installations for selected items of equipment. 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. Electric motor data and variable speed drive data shall be submitted with the driven equipment.
 - 2. Equipment and materials identification.
 - 3. Firestopping materials.
 - 4. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
 - 5. Wall, floor, and ceiling plates.
- H. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.
- I. 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, controls, 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 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. Mechanical equipment rooms.
2. Interstitial space.
3. Hangers, inserts, supports, and bracing.
4. Pipe sleeves.
5. Equipment penetrations of floors, walls, ceilings, or roofs.

J. 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. Include complete list indicating all components of the systems with diagrams of the internal wiring for each item of equipment.
2. Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

1.5 QUALITY ASSURANCE

A. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 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 5 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): pumps, compressors, water heaters, critical instrumentation, computer workstation and programming shall be

- submitted for project record and inserted into the operations and maintenance manual.
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 Contracting Officers Representative (COR).
 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.
 9. Bio-Based Materials: For products designated by the USDA's Bio-Preferred Program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specifications section. For more information regarding the product categories covered by the Bio-Preferred Program, visit <http://www.biopreferred.gov>.
- B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".

2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
 3. Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
 4. All welds shall be stamped according to the provisions of the American Welding Society.
- C. 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 COR 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.
- D. 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 documents shall be referred to the COR for resolution. Printed copies or electronic files of manufacturer's installation instructions shall be provided to the COR at least 10 working days prior to commencing installation of any item.
 2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to COR for resolution.
 3. Complete layout drawings shall be required by Paragraph, SUBMITTALS. Construction work shall not start on any system until the layout drawings have been approved by VA.
 4. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.

5. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or additional time to the Government.

E. Guaranty: Warranty of Construction, FAR clause 52.246-21.

F. Plumbing Systems: IPC, International Plumbing Code. Unless otherwise required herein, perform plumbing work in accordance with the latest version of the IPC. For IPC codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall". Reference to the "code official" or "owner" shall be interpreted to mean the COR.

G. 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). 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 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 COR. Such replacement shall be at no additional cost or additional time 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.

1.7 AS-BUILT DOCUMENTATION

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.
- C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing.
- D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

2.1 MATERIALS FOR VARIOUS SERVICES

- A. Non-pressure PVC pipe shall contain a minimum of 25 percent recycled content. Steel pipe shall contain a minimum of 25 percent recycled content.
- B. Plastic pipe, fittings and solvent cement shall meet NSF 14 and shall bear the NSF seal "NSF-PW". Polypropylene pipe and fittings shall comply with NSF 14 and NSF 61. Solder or flux containing lead shall not be used with copper pipe.

- C. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF 61 or NSF 372.
- D. In-line devices such as water meters, building valves, check valves, stops, valves, fittings, tanks and backflow preventers shall comply with NSF 61 and NSF 372.
- E. End point devices such as drinking fountains, lavatory faucets, kitchen and bar faucets, ice makers supply stops, and end-point control valves used to dispense drinking water must meet requirements of NSF 61 and NSF 372.

2.2 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 at no additional cost or time to the Government.
- 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.

2.3 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.

2.4 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 8 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.

2.5 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.

2.6 ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING (NOT USED)

2.7 VARIABLE SPEED MOTOR CONTROLLERS (NOT USED)

2.8 EQUIPMENT AND MATERIALS IDENTIFICATION (NOT USED)

2.9 FIRESTOPPING

- A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping.

2.10 GALVANIZED REPAIR COMPOUND

- A. Mil. Spec. DOD-P-21035B, paint.

2.11 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) or the following paragraphs of this Section shall be stamped and signed by a professional engineer registered in the state where the project is located. The Support system of suspended equipment over 227 kg (500 pounds) shall be submitted for approval of the COR in all cases. See the above specifications for lateral force design requirements.
- B. Type Numbers Specified: For materials, design, manufacture, selection, application, and installation refer to MSS SP-58. For selection and application refer to MSS SP-69.
- 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 100 mm (4 inches) thick when approved by the COR for each job condition.
 3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 100 mm (4 inches) thick when approved by the COR 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. For Attachment to Wood Construction: Wood screws or lag bolts.
- F. Hanger Rods: Hot-rolled steel, ASTM A36/A36M or ASTM 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 40 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.
- G. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 43 mm by 43 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.
1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).
 2. Guide individual pipes on the horizontal member of every other trapeze hanger with 8 mm (1/4 inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 15 mm (1/2 inch) galvanized steel bands, or insulated calcium silicate shield for insulated piping at each hanger.
- H. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping. 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, copper-coated, plastic coated or taped with isolation tape to prevent electrolysis.
 - 2) For vertical runs use epoxy painted, copper-coated 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.
 - i. Supports for plastic or glass piping: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp. Spring Supports (Expansion and contraction of vertical piping):
 - 1) Movement up to 20 mm (3/4 inch): Type 51 or 52 variable spring unit with integral turn buckle and load indicator.
 - 2) Movement more than 20 mm (3/4 inch): Type 54 or 55 constant support unit with integral adjusting nut, turn buckle and travel position indicator.
 - j. Spring hangers are required on all plumbing system pumps one horsepower and greater.
2. Plumbing Piping (Other Than General Types):
- a. Horizontal piping: Type 1, 5, 7, 9, and 10.
 - b. Chrome plated piping: Chrome plated supports.
 - c. Hangers and supports in pipe chase: Prefabricated system ABS self-extinguishing material, not subject to electrolytic action, to hold piping, prevent vibration and compensate for all static and operational conditions.
 - d. Blocking, stays and bracing: Angle iron or preformed metal channel shapes, 1.3 mm (18 gage) minimum.
- I. Pre-insulated Calcium Silicate Shields:
- 1. Provide 360 degree water resistant high density 965 kPa (140 psig) 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 25 mm (1 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 psig) compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36/A36M) wear plates welded to the bottom sheet metal jacket.
5. Shields may be used on steel clevis hanger type supports, trapeze hangers, roller supports or flat surfaces.

2.12 PIPE PENETRATIONS

- A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays.
- B. Pipe penetration sleeve materials shall comply with all firestopping 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, with structural engineer prior approval. Any deviation from these requirements must receive prior approval of COR.
- 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. Brass Pipe Sleeves shall be provided for pipe passing through quarry tile, terrazzo or ceramic tile floors. The sleeve shall be connected with a floor plate.
- I. 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 firestopping material and sealant to prevent the spread of fire, smoke, water and gases.
- J. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS. Bio-based materials shall be utilized when possible.
- K. Pipe passing through roof shall be installed through a 4.9 kg per square meter copper flashing with an integral skirt or flange. Skirt or flange shall extend not less than 200 mm (8 inches) from the pipe and set in a solid coating of bituminous cement. Extend flashing a minimum of 250 mm (10 inches) up the pipe. Pipe passing through a waterproofing membrane shall be provided with a clamping flange. The annular space between the sleeve and pipe shall be sealed watertight.

2.13 TOOLS AND LUBRICANTS

- A. Furnish, and turn over to the COR, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.
- C. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the COR.
- D. 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. Bio-based materials shall be utilized when possible.

2.14 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 75 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.

2.15 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, testing and operation of all devices including, but not limited to: all equipment items, valves, backflow preventers, filters, strainers, transmitters, sensors, meters and 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 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 COR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to COR for approval.
 - 2. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
 - 3. 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 COR where working area space is limited.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other services 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 COR. Damaged or defective items in the opinion of the COR, shall be replaced at no additional cost or time to the Government.
 - 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. Concrete and Grout: Concrete and shrink compensating grout 25 MPa (3000 psig) minimum, specified in Section 03 30 00, CAST-IN-PLACE CONCRETE, shall be used for all pad or floor mounted equipment.

- J. Gages, thermometers, valves and other devices shall be installed with due regard for ease in reading or operating and maintaining said devices. Thermometers and gages shall be located and positioned to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
- K. Interconnection of Controls and Instruments: Electrical interconnection is generally not shown but shall be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations. Comply with NFPA 70.
- L. 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.
- M. Work in Animal Research Areas: Seal all pipe penetrations with silicone sealant to prevent entrance of insects.
- N. Work in bathrooms, restrooms, housekeeping closets: All pipe penetrations behind escutcheons shall be sealed with plumbers putty.
- O. Switchgear Drip Protection: Every effort shall be made to eliminate the installation of pipe above data equipment, and electrical and telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum of joints. Drain valve shall be provided in low point of casement pipe.
- P. 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 or additional time 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 paragraph 3.1 shall apply.
- C. Temporary facilities and piping shall be completely removed back to the nearest active distribution branch or main pipe line and any openings in structures sealed. Dead legs are not allowed in potable water systems. 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 COR 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 COR.
- 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) 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. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Concrete bases and structural systems shall be anchored and doweled to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
 - 2. Bases and supports shall not be located and installed until equipment mounted thereon has been approved. Bases shall be sized to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Structural drawings shall be reviewed for additional requirements. 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 grout material to permit alignment and realignment.

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.
- B. All devices and equipment shall be equipped with required lubrication fittings. A minimum of one liter (one quart) of oil and 0.45 kg (1 pound) of grease of manufacturer's recommended grade and type for each different application shall be provided. All materials shall be delivered to COR 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 COR. 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. In an operating plant, cleanliness and safety shall be maintained. The plant shall be kept in an operating condition. Government personnel will be carrying on their normal duties of operating, cleaning and maintaining equipment and plant operation. Work shall be confined to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Dust and debris shall not be permitted to accumulate in the area to the detriment of plant operation. All flame cutting shall be performed to maintain the fire safety integrity of this plant. Adequate fire extinguishing facilities shall be available at all times. All work shall be performed in accordance with recognized fire protection standards including NFPA 51B. Inspections will be made by personnel of the VA Medical Center, and the Contractor shall follow all directives of the COR with regard to rigging, safety, fire safety, and maintenance of operations.

- C. 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 per Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT. This includes all concrete equipment pads, 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.
- D. 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 COR 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. Coordinate with the COR and Infection Control.

3.7 CLEANING

- 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.

3.8 IDENTIFICATION SIGNS

- A. Laminated plastic signs, with engraved lettering not less than 7 mm (3/16 inch) high, shall be provided that designates equipment function, for all equipment, switches, motor controllers, relays, meters, control devices, including automatic control valves. Nomenclature and identification symbols shall correspond to that used in maintenance manual, and in diagrams specified elsewhere. Attach by chain, adhesive, or screws.
- B. Factory Built Equipment: Metal plate, securely attached, with name and address of manufacturer, serial number, model number, size, and performance data shall be placed on factory built equipment.

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