U.S. Department of Veterans Affairs

DEPARTMENT OF VETERAN'S AFFAIRS

ON

RENOVATE PREOPERATIVE CARE UNIT

Sioux Falls, South Dakota

VA Project # 438-19-101

Project Specifications:

Volume 1

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DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS

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GENERAL REQUIREMENTS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

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

1.2 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for Renovate Preoperative Care Unit, Project Number 438-19-101 as required by drawings and specifications.

B. Visits to the site by Bidders may be made only by appointment with the Contracting Officer or Contracting Officer’s Representative.

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

D. Before placement and installation of work subject to tests by testing laboratory retained 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 workdays 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. ITEM I, BASE BID: Work includes general construction, alterations, mechanical work, electrical work, equipment, necessary removal of existing structures and construction and certain other items.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

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

1.5 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

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

B. Security Procedures:

1. General Contractor’s employees and Sub-Contractor employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. Before starting work the General Contractor shall give one week’s notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor’s employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

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

D. Document Control:

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

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

E. Motor Vehicle Restrictions
1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. A limited number of (2 to 5) permits shall be issued for General Contractor and its employees for parking in designated areas only.

1.6 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

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

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

E. Workers 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 workdays. 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 ensure such executions, Contractor shall furnish the COR with a schedule of approximate phasing 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 to ensure accomplishment of this work in successive phases mutually agreeable to the COR and Contractor, as follows:

H. Building(s) No.(s) 5 will be occupied during performance of work; but immediate areas of alterations will be vacated.

1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

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.

J. 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 the 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 the 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, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY for additional requirements.
2. Contractor shall submit a request to interrupt any such services to the COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours at no additional cost to the government.
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 the COR. Such approval will be confirmed in writing as soon as practical.

K. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged 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.

L. 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.

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

1.7 ALTERATIONS

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

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout // affected areas of building.
2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
3. 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 the 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 the COR and/or Supply Representative, to be in such condition that their

use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.243-70).

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
   1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workers in executing work of this contract.

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

1.8 DISPOSAL AND RETENTION

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
   1. 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 the 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 STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

A. The Contractor shall preserve and protect all structures and equipment 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.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

C. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.10 RESTORATION

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

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

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workers to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.

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.

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by Stone Group Architects and documentation from Sioux Falls VA Medical Center.

1.12 LAYOUT OF WORK

A. The Contractor shall lay out the work and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades established.

B. Establish and plainly mark such lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations are in accordance with lines and elevations shown on contract drawings.

1.13 AS-BUILT DRAWINGS

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

B. All variations shall be shown in the same general detail as used in the contract drawings. To ensure compliance, as-built drawings shall be made available for the COR’s 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.

1.14 WARRANTY MANAGEMENT

A. Warranty Management Plan: Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction at least 30 days before the planned pre-warranty conference, submit two sets of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesman, or of engineering background, not necessarily familiar with this contract. The term “status” as indicated below must include due date and whether item has been submitted or was approved. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly invoice for payment. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of the project acceptance and continue for the product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contactor and the Contracting Officer. Include in the warranty management plan, but not limited to, the following:

1. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the company of the Contractor, subcontractors, manufacturers or suppliers involved.
2. Furnish with each warranty the name, address and telephone number of each of the guarantor’s representatives nearest project location.
3. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers and for all commissioned systems such as fire protection and alarm systems, sprinkler systems and lightning protection systems, etc.

4. A list for each warranted equipment item, feature of construction or system indicating:
   a. Name of item.
   b. Model and serial numbers.
   c. Location where installed.
   d. Name and phone numbers of manufacturers and suppliers.
   e. Name and phone numbers of manufacturers or suppliers.
   f. Names, addresses and phone numbers of sources of spare parts.
   g. Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
   h. Starting point and duration of warranty period.
   i. Summary of maintenance procedures required to continue the warranty in force.
   j. Cross-reference to specific pertinent Operation and Maintenance manuals.
   k. Organizations, names and phone numbers of persons to call for warranty service.
   l. Typical response time and repair time expected for various warranted equipment.
5. The plans for attendance at the 4 and 9-month post construction warranty inspections conducted by the government.
6. Procedure and status of tagging of all equipment covered by extended warranties.
7. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

B. Performance Bond: The Performance Bond must remain effective throughout the construction period.
   1. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
   2. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the

contractor’s expenses, the Contracting Officer will have the right to recoup expenses from the bonding company.

3. Following oral or written notification of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

C. Pre-Warranty Conference: Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/ reviewed at this meeting. In connection with these requirements and at the time of the Contractor’s quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contract will be located within the local service area of the warranted construction, be continuously available and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in conjunction with other portions of this provision.

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

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

   Code 1-Life Safety Systems

   a. Fire suppression systems.

   b. Fire alarm system(s).

   Code 1-Air Conditioning Systems

   a. Air conditioning leak in part of the building, if causing damage.

   b. Air conditioning system not cooling properly.

   Code 1 Doors

   a. Overhead doors not operational, causing a security, fire or safety problem.

   b. Interior, exterior personnel doors or hardware, not functioning properly, causing security, fire or safety problem.

   Code 3-Doors

   a. Overhead doors not operational.

   b. Interior/exterior personnel doors or hardware not functioning properly.

   Code 1-Electrical

   a. Power failure (entire area or any building operational after 1600 hours).

   b. Security lights.

   c. Smoke detectors.

   Code 2-Electrical

   a. Power failure (no power to a room or part of building).

   b. Receptacles and lights not operational (in a room or part of building).

   Code 3-Electrical

   a. Exterior lights not operational.

   Code 1-Gas

   a. Leaks and pipeline breaks.

   Code 1-Heat

a. Power failure affecting heat.

Code 1-Plumbing

a. Hot water heater failure.

b. Leaking water supply pipes.

Code 2-Plumbing

a. Flush valves not operating properly

b. Fixture drain, supply line or any water pipe leaking.

c. Toilet leaking at base.

Code 3- Plumbing

a. Leaky faucets.

Code 3-Interior

a. Floors damaged.

b. Paint chipping or peeling.

c. Casework damaged.

Code 1-Roof Leaks

a. Damage to property is occurring.

Code 2-Water (Exterior)

a. No water to facility.

Code 2-Water (Hot)

a. No hot water in portion of building listed.

Code 3

a. All work not listed above.

E. Warranty Tags: At the time of installation, tag each warranted item with a durable, oil and water-resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	

1.15 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on Medical Center property. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.16 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 the COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.
2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations.* Voltage supplied to

each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.

3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system. Duct cleaning shall be provided by the Contractor at no additional cost to the Government, if ducts are dirty as determined by the COR.
6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.

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

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

1.17 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.
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. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by COR.

1.18 TEMPORARY TOILETS

A. Contractor may have for use of Contractor's workers, such toilet accommodations as may be assigned to Contractor by Medical Center. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workers. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

1.19 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. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated paraphernalia and repair restore the infrastructure as required.

C. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:

1. Obtain heat by connecting to Medical Center heating distribution system.

   a. Steam is available; tap into existing distribution system.

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

1. Obtain electricity by connecting to the Medical Center electrical distribution system.

E. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection 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's discretion) of use of water from Medical Center's system.

1.20 NEW TELEPHONE EQUIPMENT

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

1.21 TESTS

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

B. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.

C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

D. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. E. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a

reasonable period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.

E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.22 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 (two [2] bound hard files and PDF files on CD) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Omit all special characters in electronic files (i.e. #,%,&,*,:,<,>,?,/). 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 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.

1.23 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government-furnished property as drawn and specified.

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

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

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time, the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.
2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.

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

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

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

1.24 RELOCATED EQUIPMENT ITEMS

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

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

C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, at the main whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".

D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

E. Contractor shall employ services of an installation engineer, who is an authorized representative of the manufacturer of this equipment to supervise assembly and installation of existing equipment, required to be relocated to assure it is in proper operating condition. Any warranties in effect must not be voided.

F. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

1.25 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide a minimum of 10 photographs of construction progress taken per day with all photographs submitted weekly.

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SECTION 01 32 16.15
PROJECT SCHEDULES

PART 1- GENERAL

1.1 DESCRIPTION:

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

1.2 CONTRACTOR'S REPRESENTATIVE:

A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).

B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.

C. The Contractor’s representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

A. The Contractor shall submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal shall include:

1. The name and address of the proposed consultant.
2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.

B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal.

In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor’s monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.

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

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

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event

description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
   1. Notify the Contractor concerning his actions, opinions, and objections.
   2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

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

D. The Complete Project Schedule shall contain all major work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

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

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

C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.

D. The Contractor shall cost load work activities/events for all BID ITEMS 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 workdays at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.

2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 workdays.
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 COTR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.

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 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

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

1.9 PAYMENT AND PROGRESS REPORTING

A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The

Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three workdays 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 with 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 COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project

Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
   1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
   2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
   3. The schedule does not represent the actual prosecution and progress of the project.
   4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.

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

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

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

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

1.12 ADJUSTMENT OF CONTRACT COMPLETION

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

B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

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

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

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

PART 1 – GENERAL

1.1 DESCRIPTION

A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.

B. Detailed submittal requirements are found in the technical sections of the contract specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.

C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor’s expense.

1.2 DEFINITIONS

A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.

B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.

C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.

D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples

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

E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.

F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.

H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.

I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.

J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.

K. Closeout Submittals: Documentation necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a phase of construction on a multi-phase contract.

1.3 SUBMITTAL REGISTER

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

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

1.4 SUBMITTAL SCHEDULING

A. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment.
B. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
C. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
D. All submittals are required to be approved prior to the start of the specified work activity.

1.5 SUBMITTAL PREPARATION

A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain

the excessive amount of irrelevant or unnecessary data will be returned with review.

E. Provide a transmittal form for each submittal with the following information:
   1. VA project title, location and number.
   2. VA construction contract number.
   3. Date of the drawings and revisions.
   4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
   5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
   6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
   7. Product identification and location in project.

F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting for VA review. Proposed deviations from the contract requirements are to be clearly identified. All deviations submitted must include a side by side comparison of item being proposed against item specified. Failure to point out deviations will result in the VA requiring removal and replacement of such work at the Contractor's expense.

G. Stamp, sign, and date each submittal transmittal form indicating action taken.

H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

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

1.6 SUBMITTAL FORMAT AND TRANSMISSION

A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.

B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.

C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.

D. Provide electronic documents through a VA approved file sharing system.

E. Provide hard copies of submittals when requested by the Contracting Officer. Up to 3 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the VA.

1.7 SAMPLES

A. Submit two sets of physical samples showing range of variation, for each required item to Stone Group Architects, 600 E 7th St, Sioux Falls, SD 57104.

B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.

C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

D. Before submitting samples, the Contractor is to ensure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.

F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.9 TEST REPORTS

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

1.10 VA REVIEW OF SUBMITTALS AND RFIS

A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project will assist the VA in reviewing all submittals and determining

contractual compliance. Review will be only for conformance with the applicable codes, standards and contract requirements.

B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.

C. Period of review for each resubmittal is the same as for initial submittal.

D. VA review period is 15 working days for submittals.

E. VA review period is 10 working days for RFIs.

F. The VA will return submittals to the Contractor with the following notations:

1. "Approved": authorizes the Contractor to proceed with the work covered.
2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.
3. "Revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.
4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

1.11 APPROVED SUBMITTALS

A. The VA approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.

B. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor’s expense.

C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

D. Retain a copy of all approved submittals at project site, including approved samples.

1.12 WITHHOLDING OF PAYMENT

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

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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-2010	Guidelines 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-2015	Standard for Electrical Safety in the Workplace
99-2012	Health Care Facilities Code
241-2013	Standard for Safeguarding Construction, Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC Manual	Comprehensive Accreditation and Certification Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20	Standards for Protection Against Radiation

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

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

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

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

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

I. VHA Directive 2005-007

1.2 DEFINITIONS:

A. 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.

F. 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) VA contract number;
         3) VA project name and number;
         4) Brief project description, description of work to be performed, and location.

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 AUTHORITY.** 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) and all supervisors/foremen.

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

i. **PLANS (PROGRAMS, PROCEDURES) REQUIRED.** Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational, patient, and public safety risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:
1) Emergency response;
2) Contingency for severe weather;
3) Fire Prevention;
4) Medical Support;
5) Posting of emergency telephone numbers;
6) Prevention of alcohol and drug abuse;
7) Site sanitation(housekeeping, drinking water, toilets);

8) Night operations and lighting;
9) Hazard communication program;
10) Welding/Cutting "Hot" work;
11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
12) General Electrical Safety;
13) Hazardous energy control (Machine LOTO);
14) Site-Specific Fall Protection & Prevention;
15) Excavation/trenching;
16) Asbestos abatement;
17) Lead abatement;
18) Crane Critical lift;
19) Respiratory protection;
20) Health hazard control program;
21) Radiation Safety Program;
22) Abrasive blasting;
23) Heat/Cold Stress Monitoring;
24) Crystalline Silica Monitoring (Assessment);
25) Demolition plan (to include engineering survey);
26) Formwork and shoring erection and removal;
27) Precast Concrete;
28) Public (Mandatory compliance with ANSI/ASSE A10.34-2012).

C. Submit the APP 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, 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 Contracting Officer Representative. 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 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 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.

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 COR 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, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, and Scaffolds).

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, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, and Scaffolds). 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, and scaffolds shall have a specialized formal course in the hazard recognition and 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 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 COR that individuals have undergone contractor's safety briefing.

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

1.9 INSPECTIONS:

A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to the 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 or Government Designated Authority 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 or Government Designated Authority 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 or Government Designated Authority as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major Incidents, High Visibility Incidents, or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the COR or Government Designated Authority determines 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 or Government Designated Authority within 5 calendar days of the accident. The COR or

Government Designated Authority will provide copies of any required or special forms.

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

D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the COR or Government Designated Authority monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the COR or Government Designated Authority as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):

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

B. Mandatory PPE includes:

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

1.12 INFECTION CONTROL

A. Infection Control is critical in all Medical Center facilities. Interior construction activities causing disturbance of existing dust,

or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas.

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 or Government Designated Authority before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the 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 III, 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 or Government Designated Authority.
      2) Execute work by methods to minimize raising dust from construction operations.
      3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.
   b. Upon Completion:
      1) Clean work area upon completion of task
      2) Notify the COR or Government Designated Authority.
2. Class II requirements:
   a. During Construction Work:
      1) Notify the COR or Government Designated Authority.
      2) Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.
      3) Water mist work surfaces to control dust while cutting.
      4) Seal unused doors with duct tape.
      5) Block off and seal air vents.
      6) Remove or isolate HVAC system in areas where work is being performed.

7) Adhesive walk off carpet/walk-off mats shall be used at all interior transitions from the construction area to occupied Medical Center area.
8) Maintain negative air pressure within work site using HEPA-equipped air filtration units.

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 or Government Designated Authority.

3. Class III requirements:
a. During Construction Work:
1) Obtain permit from the COR or Government Designated Authority.
2) Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system.
3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully.
4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
5) Contain construction waste before transport in tightly covered containers.
6) Cover transport receptacles or carts. Tape covering unless solid lid.
7) Adhesive walk off carpet/walk-off mats shall be used at all interior transitions from the construction area to occupied Medical Center area.

b. Upon Completion:

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

4. Class IV requirements:
   a. During Construction Work:
      1) Obtain permit from the COR or Government Designated Authority.
      2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.
      3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
      4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.5) Seal holes, pipes, conduits, and punctures.
      6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
      7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.

8) Adhesive walk off carpet/walk-off mats shall be used at all interior transitions from the construction area to occupied Medical Center area.

b. Upon Completion:

1) Do not remove barriers from work area until completed project is inspected by the COR or Government Designated Authority with thorough cleaning by the VA Environmental Services Dept.
2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction.
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 or Government Designated Authority.

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

1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:
   a. Class III & IV (where dust control is the only hazard, and an agreement is reached with the COR and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping
   b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
   c. Class III & IV - Seal all penetrations in existing barrier airtight
   d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris

e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing
f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.

D. Products and Materials:
1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the COR.
2. Barrier Doors: Self Closing, Class C, ¾ hour fire/smoke rated solid core wood in steel frame, painted.
3. 5/8" Type "X" fire-rated drywall.
4. HEPA filtration is required where the exhaust duct may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the Medical Center through intake vents or building openings. Install HEPA(High Efficiency Particulate Air)-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. 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. 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 or as often as dictated by the COR.
7. Disinfectant: Hospital-approved disinfectant or equivalent product.
8. Portable Ceiling Access Module
9. 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 calibrator on installation, maintained with periodic calibration and monitored by the contractor.

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

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

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

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

1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
4. Vacuum and wet mop all transition areas from construction to the occupied Medical Center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.

5. The contractor shall not haul debris through patient-care areas without prior approval of the COR and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

I. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from all areas 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 air ducts within project area 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 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 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, ¾ hour fire/smoke rated doors with self-closing devices.
2. Install fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.

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

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

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

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

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

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

K. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with the COR or Government Designated Authority. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded and copies provided to the COR.

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

M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with the Engineering Office. Obtain permits from the COR at least 24 hours in advance . Designate contractor's responsible project-site fire prevention program manager to permit hot work.

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

O. Smoking: Smoking is prohibited except in designated smoking rest areas.

P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

1.14 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).

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 or Government Designated Authority.

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

D. 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).

1.15 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.
   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.
   4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.16 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.

1.17 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 or other Government Designated Authority 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document.

D. Crane operators shall not carry loads
   1. over the general public or VAMC personnel
   2. over any occupied building unless
      a. the top two floors are vacated
      b. or overhead protection with a design live load of 300 psf is provided

1.18 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

1.19 WELDING AND CUTTING

A. As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with the COR or other Government Designated Authority at least 24 hours in advance . Designate contractor's responsible project-site fire prevention program manager to permit hot work.

1.20 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.

1.21 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.

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.

- - - E N D - - -

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL
1.1 DESCRIPTION

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

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

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

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

A. The specifications and standards cited in this solicitation can be examined at the following location:
DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001
Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

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

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

AA	Aluminum Association Inc. http://www.aluminum.org
AABC	Associated Air Balance Council http://www.aabchq.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org
AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AH	American Hort https://www.americanhort.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org
AIA	American Institute of Architects http://www.aia.org

AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction https://aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ARPM	Association for Rubber Product Manufacturers https://arpm.com
ASABE	American Society of Agricultural and Biological Engineers https://www.asabe.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering International http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials International http://www.astm.org
AWI	Architectural Woodwork Institute https://www.awinet.org
AWS	American Welding Society https://www.aws.org
AWWA	American Water Works Association https://www.awwa.org
BHMA	Builders Hardware Manufacturers Association https://www.buildershardware.com

BIA	The Brick Industry Association http://www.gobrick.com
CAGI	Compressed Air and Gas Institute https://www.cagi.org
CGA	Compressed Gas Association, Inc. https://www.cganet.com
CI	The Chlorine Institute, Inc. https://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association https://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute https://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute https://www.chainlinkinfo.org
CPA	Composite Panel Association https://www.compositepanel.org
CPMB	Concrete Plant Manufacturers Bureau https://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute https://www.crsi.org
CTI	Cooling Technology Institute https://www.cti.org
DHA	Decorative Hardwoods Association https://www.decorativehardwood.org
DHI	Door and Hardware Institute https://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute https://www.eei.org
EPA	United States Environmental Protection Agency https://www.epa.gov
ETL	ETL Testing Services http://www.intertek.com
FAA	Federal Aviation Administration https://www.faa.gov

FCC	Federal Communications Commission https://www.fcc.gov
FPS	Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.glasswebsite.com
FM	Factory Mutual Global Insurance https://www.fmglobal.com
GA	Gypsum Association https://gypsum.org
GSA	General Services Administration https://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
ICC	International Code Council https://shop.iccsafe.org
ICEA	Insulated Cable Engineers Association https://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers https://www.ieee.org\
IGMA	Insulating Glass Manufacturers Alliance https://www.igmaonline.org
IMSA	International Municipal Signal Association http://www.imsasafety.org
MBMA	Metal Building Manufacturers Association https://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry http://msshq.org
NAAMM	National Association of Architectural Metal Manufacturers https://www.naamm.org
PHCC	Plumbing-Heating-Cooling Contractors Association https://www.phccweb.org
NBS	National Bureau of Standards See - NIST

NBBI	The National Board of Boiler and Pressure Vessel Inspectors https://www.nationalboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association https://www.nema.org
NFPA	National Fire Protection Association https://www.nfpa.org
NHLA	National Hardwood Lumber Association https://www.nhla.com
NIH	National Institute of Health https://www.nih.gov
NIST	National Institute of Standards and Technology https://www.nist.gov
NELMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association (See CPA, Composite Panel Association)
NSF	National Sanitation Foundation http://www.nsf.org
OSHA	Occupational Safety and Health Administration Department of Labor https://www.osha.gov
PCA	Portland Cement Association https://www.cement.org
PCI	Precast Prestressed Concrete Institute https://www.pci.org
PPI	Plastics Pipe Institute https://www.plasticpipe.org
PEI	Porcelain Enamel Institute http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org
RFCI	Resilient Floor Covering Institute https://www.rfci.com
RIS	Redwood Inspection Service (See Western Wood Products Association) https://www.wwpa.org

SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
SJI	Steel Joist Institute https://www.steeljoist.org
SMACNA	Sheet Metal & Air-Conditioning Contractors' National Association https://www.smacna.org
SSPC	The Society for Protective Coatings https://www.sspc.org
STI	Steel Tank Institute https://www.steeltank.com
SWI	Steel Window Institute https://www.steelwindows.com
TCNA	Tile Council of North America https://www.tcnatile.com
TEMA	Tubular Exchanger Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute https://www.tpinst.org
UBC	The Uniform Building Code (See ICC)
UL	Underwriters' Laboratories Incorporated https://www.ul.com
ULC	Underwriters' Laboratories of Canada https://www.ulc.ca
WCLB	West Coast Lumber Inspection Bureau http://www.wclib.org
WDMA	Window and Door Manufacturers Association https://www.wdma.com
WRCLA	Western Red Cedar Lumber Association https://www.realcedar.com
WWPA	Western Wood Products Association http://www.wwpa.org

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SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies requirements for Contractor Quality Control (CQC) for Design-Bid-Build (DBB) construction projects. This section can be used for both project types.

1.2 APPLICABLE PUBLICATIONS

A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. ASTM International (ASTM)

1. D3740 - (2012a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
2. E329 - (2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.3 SUBMITTALS

A. Government approval is required for all submittals. CQC inspection reports shall be submitted under this Specification section and follow the [Applicable CQC Control Phase (Preparatory, Initial, or Follow-Up)]:

1. Preconstruction Submittals
    a. Interim CQC Plan
    b. CQC Plan
    c. Additional Requirements for Design Quality Control (DQC) Plan
2. Design Data
    a. Discipline-Specific Checklists
    b. Design Quality Control
3. Test Reports
    a. Verification Statement

PART 2 PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Establish and maintain an effective quality control (QC) system that complies with the FAR Clause 52.246.12 titled “Inspection of Construction”. QC consists of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all design and construction

operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Office or Authorized designee for non-compliance with the quality requirements specified in the Contract. In this context the highest-level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CQC PLAN:

A. Submit no later than 15 days after receipt of Notice to Proceed (NTP) the CQC Plan proposed to implement the requirements of the FAR Clause 52.246.12 titled "Inspection of Construction". The Government will consider an Interim CQC Plan for the first 15 days of operation, which must be accepted within 20 business days of NTP. Design and/or construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an Interim plan applicable to the particular feature of work to be started. Work outside of the accepted Interim CQC Plan will not be permitted to begin until acceptance of a CQC Plan or another Interim CQC Plan containing the additional work scope is accepted.

B. Content of the CQC Plan: Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record consultants, architects/engineers (A/E), fabricators, suppliers, and purchasing agents:

1. A description of the QC organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three-phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.
2. The name, qualifications (in resume format) duties, responsibilities, and authorities of each person assigned a CQC function.
3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities

and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will to the Contracting Officer or Authorized designee. be issued by the CQC System Manager. Furnish copies of these letters

4. Procedures for scheduling, reviewing, certifying, and managing submittals including those of subcontractors, designers of record, consultants, A/E's offsite fabricators, suppliers and purchasing agents. These procedures must be in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.
5. Control, verification, and acceptance of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer or Authorized designee are required to be used)
6. Procedures for tracking Preparatory, Initial, and Follow-Up control phases and control, verification, and acceptance tests including documentation.
7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
8. Reporting procedures, including proposed reporting formats.
9. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of specifications can generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Coordination meeting.
10. Coordinate schedule work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections and Schedule of Special Inspections. Where the applicable Code issue by the International Code Council (ICC) calls

for inspections by the Building Official, the Contractor must include the inspections in the CQC Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the CQC Plan.

C. Additional Requirements for Design Quality Control (DQC) Plan: The following additional requirements apply to the DQC Plan for DB projects only and not DBB projects:

1. Submit and maintain a DQC Plan as an effective QC program which assures that all services required by this contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, all documents must be technically reviewed by competent, independent reviewers identified in the DQC Plan. The same element that produced the product may not perform the independent technical review (ITR). Correct errors and deficiencies in the design documents prior to submitting them to the Government.
2. Include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific Contract period. This should be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item. This should be a forward planning as well as a project monitoring tool. The schedule reflects calendar days and not dates for each activity. If the schedule is changed, submit a revised schedule reflecting the change within 7 calendar days. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit at each design phase as part of the project documentation these completed discipline-specific checklists.
3. Implement the DQC Plan by a DQC Manager who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated. This individual must be a person who has verifiable engineering or architectural design experience and is a Professional Engineer or Registered Architect within the state of Construction location. Notify the Contracting Officer or Authorized

designee, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

D. Acceptance of Plan: Acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in the CQC Plan and operations including removal of personnel as necessary, to obtain the quality specified.

E. Notification of Changes: After acceptance of the CQC Plan, notify the Contracting Officer or Authorized designee in writing of any proposed change. Proposed changes are subject to acceptance by the Government prior to implementation by the Contractor.

3.3 COORDINATION MEETING:

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

3.4 QUALITY CONTROL ORGANIZATION:

A. Personnel Requirements: The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, a Design Quality Manager (if applicable), and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager shall satisfy the requirements of Specification 01 35 26 Safety Requirements and reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety

and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer or Authorized designee. Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawings submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Government.

B. CQC System Manager: Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC system Manager is required to be a PM or SRE to determine qualifications based on project complexity at construction review. This CQC System manager is on the site at all times during construction and is employed by the General Contractor. The CQC System Manger is assigned as CQC System Manager but has duties as project superintendent in addition to quality control.

C. Additional Requirements: In addition to the above experience and education requirements, the CQC System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Construction course. If the CQC System Manager does not have a current specification, obtain the CQM for Contractors course identification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer or Authorized designee for information on the next scheduled class.

D. Organizational Changes: Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer or Authorized designee for acceptance.

3.5 SUBMITTALS AND DELIVERABLES: Submittals have to comply with the requirements in Section 01 33 23 Shop Drawings, Product Data, and Samples. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00 General Commissioning Requirements is included in the contract, the submittals required by the section have to be coordinated with the Section 01 33 23 Shop Drawings, Product Data, and Samples to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL:

A. CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

1. Preparatory Phase: This phase is performed prior to beginning work on each definable feature of work after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:
   a. A review of each paragraph of applicable specifications, references codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
   b. Review of the Contract drawings.
   c. Check to assure that all materials and equipment have been tested, submitted, and approved.
   d. Review of provisions that have been made to provide required control inspection and testing.
   e. Review Special Inspections required by Section 01 45 35 Special Inspections, that Statement of Special Inspections and the Schedule of Specials Inspections.
   f. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.

g. Examination of required materials, equipment, and sample work to assure that they are on hand conform to approved shop drawings or submitted data, and are properly stored.
h. Review of the appropriate Activity Hazard Analysis (AHA) to assure safety requirements are met.
i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards – contract defined or industry standard if not contract defined - for that feature of work.
j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
k. Discussion of the initial control phase.
l. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the Preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the Preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

B. Initial Phase: This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:
1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the Preparatory meeting.
2. Verify adequacy of controls to ensure full contract compliance. Verify the required control inspection and testing is in compliance with the contract.
3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
4. Resolve all differences.
5. Check safety to include compliance with an upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

6. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the initial phase for definable features of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with Follow-Up phases.
7. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
8. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections.

C. Follow-Up Phase: Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements until the completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final Follow-Up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections

D. Additional Preparatory and Initial Phases on the same definable features of work if: the quality ongoing work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

A. Testing Procedure: Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance test when specified. Procure the services of a Department of Veteran Affairs approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.

2. Verify that facilities and testing equipment are available and comply with testing standards.
3. Check test instrument calibration data against certified standards.
4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
5. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the unique sequential control number identifying the test. If approved by the Contracting Officer or Authorized designee, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer or Authorized designee. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

B. Testing Laboratories: All testing laboratories must be validated through the procedures contained in Specification section 01 45 29 Testing Laboratory Services.
   1. Capability Check: The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician’s testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.
   2. Capability Recheck: If the selected laboratory fails the capability check, the Contractor will be assessed a charge equal to value of recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

C. Onsite Laboratory: The Government reserves the right to utilize the Contractor’s control testing laboratory and equipment to make assurance tests, and to check the Contractor’s testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

A. Punch-Out Inspection: Conduct an inspection of the work by the CQC system Manager near the end of the work, or any increment of the work established by a time stated FAR 52.211-10 – Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final Inspection.

B. Pre-Final Inspection: The Government will perform the Pre-Final Inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final Acceptance Inspection with the customer can be scheduled. Correct any items noted on the Pre-Final Inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate construction completion dates.

C. Final Acceptance Inspection: The Contractor’s QC Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer’s Authorized designee is required to be in attendance at the Final Acceptance Inspection. Additional Government personnel can also be in attendance. The Final Acceptance Inspection will be formally scheduled by the Contracting Officer’s or Authorized designee based upon results of the Pre-Final Inspection. Notify the Contracting Officer through the Resident Engineer office at least 14 days prior to the Final Acceptance Inspection and include the Contractor’s assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date schedule for the Final Acceptance Inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the

Contractor for the Government's additional inspection cost in accordance with FAR Clause 52.246-12 titled "Inspection of Construction".

3.9 DOCUMENTATION

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

B. Verification Statement: Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily with 1 week after the date covered by the report,

except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit on report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate QC personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

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

3.11 NOTIFICATION OF NONCOMPLIANCE: The Contracting Officer or Authorized designee will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor should take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO):

T27-11 .....Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates

T96-02 (R2006) .....Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

T99-10 .....Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop

T104-99 (R2007) .....Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

T180-10 .....Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop

T191-02(R2006) .....Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method

T310-13 .....Standard Method of Test for In-place Density and Moisture Content of Soil and Soil-aggregate by Nuclear Methods (Shallow Depth)

C. American Concrete Institute (ACI):

506.4R-94 (R2004) .....Guide for the Evaluation of Shotcrete

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

A370-12 .....Standard Test Methods and Definitions for Mechanical Testing of Steel Products

A416/A416M-10 .....Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

C31/C31M-10 .....Standard Practice for Making and Curing Concrete Test Specimens in the Field

C33/C33M-11a .....Standard Specification for Concrete Aggregates

C39/C39M-12 .....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C109/C109M-11b .....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

C136-06 .....Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C138/C138M-10b .....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C140-12 .....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C143/C143M-10a .....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10 .....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b .....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C330/C330M-09 .....Standard Specification for Lightweight Aggregates for Structural Concrete

C567/C567M-11 .....Standard Test Method for Density Structural Lightweight Concrete

C780-11 .....Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C1019-11 .....Standard Test Method for Sampling and Testing Grout

C1064/C1064M-11 .....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c .....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1314-11a .....Standard Test Method for Compressive Strength of Masonry Prisms

D422-63(2007) .....Standard Test Method for Particle-Size Analysis of Soils

D698-07e1 .....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

D1140-00(2006) .....Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve

D1143/D1143M-07e1 .....Standard Test Methods for Deep Foundations Under Static Axial Compressive Load

D1188-07e1 .....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

D1556-07 .....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09 .....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3 (2,700 KNm/m3))

D2166-06 .....Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

D2167-08) .....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2216-10 .....Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2974-07a .....Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-11 .....Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D3740-11 .....Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction

D6938-10 .....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E94-04(2010) .....Standard Guide for Radiographic Examination

E164-08 .....Standard Practice for Contact Ultrasonic Testing of Weldments

E329-11c .....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09 .....Standard Specification for Agencies Performing Non-Destructive Testing

E605-93(R2011) .....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members

E709-08 .....Standard Guide for Magnetic Particle Examination

E1155-96(R2008) .....Determining FF Floor Flatness and FL Floor Levelness Numbers

F3125/F3125M-15 .....Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

E. American Welding Society (AWS):

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

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by the COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of the COR to such failure.

C. Written Reports: Testing laboratory shall submit test reports to the COR, Contractor, unless other arrangements are agreed to in writing by

the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to the COR immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONCRETE:

A. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the specification requirements. Rejected loads are to be removed from the site at the Contractor’s expense. Any rejected concrete that is placed will be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m^3 (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by the COR make three cylinders for each 80 m^3 (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. The COR may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day’s pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m^3 (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m^3 (100 cubic yards) at random. For

pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.

6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.

B. Laboratory Tests of Field Samples:

1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by the COR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Furnish certified compression test reports (duplicate) to the COR. In test report, indicate the following information:
   a. Cylinder identification number and date cast.
   b. Specific location at which test samples were taken.
   c. Type of concrete, slump, and percent air.
   d. Compressive strength of concrete in MPa (psi).
   e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
   f. Weather conditions during placing.
   g. Temperature of concrete in each test cylinder when test cylinder was molded.
   h. Maximum and minimum ambient temperature during placing.
   i. Ambient temperature when concrete sample in test cylinder was taken.
   j. Date delivered to laboratory and date tested.

3.2 MASONRY:

A. Mortar Tests:

1. Laboratory compressive strength test:
   a. Comply with ASTM C780.
   b. Obtain samples during or immediately after discharge from batch mixer.
   c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
   d. Test one sample at 7 days and 2 samples at 28 days.
2. Two tests during first week of operation; one test per week after initial test until masonry completion.

B. Grout Tests:
   1. Laboratory compressive strength test:
      a. Comply with ASTM C1019.
      b. Test one sample at 7 days and 2 samples at 28 days.
      c. Perform test for each 230 m^2 (2500 square feet) of masonry.

C. Masonry Unit Tests:
   1. Laboratory Compressive Strength Test:
      a. Comply with ASTM C140.
      b. Test 3 samples for each 460 m^2 (5000 square feet) of wall area.

D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m^2 (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

3.3 STRUCTURAL STEEL:

A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Welding shall conform to AWS D1.1 Structural Welding Code.

B. Prefabrication Inspection:
   1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
   2. Approve welding procedure qualifications either by pre-qualification or by witnessing qualifications tests.
   3. Approve welder qualifications by certification or retesting.
   4. Approve procedure for control of distortion and shrinkage stresses.
   5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.

C. Fabrication and Erection:
   1. Weld Inspection:
      a. Inspect welding equipment for capacity, maintenance and working condition.
      b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
      c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
      d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
      e. Measure 25 percent of fillet welds.

f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
   1) 20 percent of all shear plate fillet welds at random, final pass only.
   2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
   3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
   4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
   5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.

g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.

h. Verify that correction of rejected welds is made in accordance with AWS D1.1.

i. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.

2. Bolt Inspection:

a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM F3125 Bolts.

b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM F3125 Bolts. Inspect all bolts in connection when one or more are rejected.

c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM F3125 Bolts. Inspect all bolts in connection when one or more are rejected.

d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.
f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.

D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to the COR.

3.4 SPRAYED-ON FIREPROOFING:

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

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.

B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.

C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:

1. Waste Management Plan development and implementation.
2. Techniques to minimize waste generation.
3. Sorting and separating of waste materials.
4. Salvage of existing materials and items for reuse or resale.
5. Recycling of materials that cannot be reused or sold.

D. At a minimum, the following waste categories shall be diverted from landfills:

1. Soil.
2. Inerts (eg, concrete, masonry and asphalt).
3. Clean dimensional wood and palette wood.
4. Green waste (biodegradable landscaping materials).
5. Engineered wood products (plywood, particle board and I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, copper, etc).
7. Cardboard, paper and packaging.
8. Bitumen roofing materials.
9. Plastics (eg, ABS, PVC).
10. Carpet and/or pad.
11. Gypsum board.
12. Insulation.
13. Paint.
14. Fluorescent lamps.

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

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 25 percent.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.wbdg.org/tools/cwm.php provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

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

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
   1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
   2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.

M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.

N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.

O. Return: To give back reusable items or unused products to vendors for credit.

P. Salvage: To remove waste materials from the site for resale or re-use by a third party.

Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.

R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:

B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
   1. Procedures to be used for debris management.
   2. Techniques to be used to minimize waste generation.
   3. Analysis of the estimated job site waste to be generated:

a. List of each material and quantity to be salvaged, reused, recycled.
b. List of each material and quantity proposed to be taken to a landfill.

4. Detailed description of the Means/Methods to be used for material handling.
   a. On site: Material separation, storage, protection where applicable.
   b. Off site: Transportation means and destination. Include list of materials.
      1) Description of materials to be site-separated and self-hauled to designated facilities.
      2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
   c. The names and locations of mixed debris reuse and recycling facilities or sites.
   d. The names and locations of trash disposal landfill facilities or sites.
   e. Documentation that the facilities or sites are approved to receive the materials.

C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

B. U.S. Green Building Council (USGBC):
LEED Green Building Rating System for New Construction

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. List of each material and quantity to be salvaged, recycled, 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, and invoices. Include the net total costs for each disposal.

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SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.

B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 7, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.

C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.

D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 7, Division 8, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.

E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA’s operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy

phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the VA’s operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

1.2 CONTRACTUAL RELATIONSHIPS

A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the Resident Engineer as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.

B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Resident Engineer and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the Resident Engineer and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the Resident Engineer.

C. Whole Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties

(Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and Resident Engineer. Thus, the procedures outlined in this specification must be executed within the following limitations:
   1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and the Contractor.
   2. Commissioning Issues identified by the Commissioning Agent will be delivered to the Resident Engineer and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
   3. In the event that any Commissioning Issues and suggested resolutions are deemed by the Resident Engineer to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or Resident Engineer will issue an official directive to this effect.
   4. All parties to the Commissioning Process shall be individually responsible for alerting the Resident Engineer of any issues that they deem to constitute a potential contract change prior to acting on these issues.
   5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or Resident Engineer, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 32 16.01 ARCHITECTURAL AND ENGINEERING CPM SCHEDULES

C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

D. Section 01 81 13 SUSTAINABLE CONSTRUCTION REQUIREMENTS

E. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.4 SUMMARY

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

B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

1.5 ACRONYMS

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)
COR	Contracting Officer’s Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery

List of Acronyms	
Acronym	Meaning
NCA	Department of Veterans Affairs National Cemetery Administration
NEBB	National Environmental Balancing Bureau
O&M	Operations & Maintenance
OPR	Owner's Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
TAB	Test Adjust and Balance
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management
VACO	VA Central Office
VA PM	VA Project Manager
VA-RE	VA Resident Engineer
USGBC	United States Green Building Council

1.6 DEFINITIONS

Acceptance Phase Commissioning: Commissioning tasks executed after most construction has been completed, most Site Observations and Static Tests have been completed and Pre-Functional Testing has been completed and accepted. The main commissioning activities performed during this phase are verification that the installed systems are functional by conducting Systems Functional Performance tests and Owner Training.

Accuracy: The capability of an instrument to indicate the true value of a measured quantity.

Back Check: A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review

Basis of Design (BOD): The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

Benchmarks: Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself.. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

Building Information Modeling (BIM) Building Information Modeling is a parametric database which allows a building to be designed and constructed virtually in 3D, and provides reports both in 2D views and as schedules. This electronic information can be extracted and reused for pre-populating facility management CMMS systems. Building Systems Commissioning (BSC): NEBB acronym used to designate its commissioning program.

Calibrate: The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.

CCTV: Closed circuit Television. Normally used for security surveillance and alarm detections as part of a special electrical security system.

COBie: Construction Operations Building Information Exchange (COBie) is an electronic industry data format used to transfer information developed during design, construction, and commissioning into the Computer Maintenance Management Systems (CMMS) used to operate facilities. See the Whole Building Design Guide website for further information (http://www.wbdg.org/resources/cobie.php)

Commissionability: Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned

Commissioning Agent (CxA): The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.

Commissioning Checklists: Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

Commissioning Design Review: The commissioning design review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency, control systems' sequence of operations including building automation system features; commissioning specifications and the ability to functionally test the systems.

Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also – Commissioning Observation).

Commissioning Manager (CxM): A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.

Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)

Commissioning Plan: A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.

Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

Commissioning Report: The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.

Commissioning Representative (CxR): An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.

Commissioning Specifications: The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.

Commissioning Team: Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.

Construction Phase Commissioning: All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Contract Documents (CD): Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings, specifications and all applicable contract modifications or supplements.

Construction Phase Commissioning (CPC): All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

Coordination Drawings: Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel, ductwork, major piping and electrical conduit and show the elevations and locations of the above components.

Data Logging: The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.

Deferred System Test: Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.

Deficiency: See "Commissioning Issue".

Design Criteria: A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.

Design Intent: The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are

utilized to provide a written record of these ideas, concepts and criteria.

Design Narrative: A written description of the proposed design solutions that satisfy the requirements of the OPR.

Design Phase Commissioning (DPC): All commissioning tasks executed during the design phase of the project.

Environmental Systems: Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and dehumidification for the purpose of human comfort or process control of temperature and humidity.

Executive Summary: A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.

Functionality: This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.

Functional Test Procedure (FTP): A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

Industry Accepted Best Practice: A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.

Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security

Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

Issues Log: A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the Commissioning Team during the course of the Commissioning Process.

Lessons Learned Workshop: A workshop conducted to discuss and document project successes and identify opportunities for improvements for future projects.

Maintainability: A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.

Manual Test: Testing using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

Owner's Project Requirements (OPR): A written document that details the project requirements and the expectations of how the building and its systems will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Peer Review: A formal in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning review. The VA usually hires an independent third-party (called the IDIQ A/E) to conduct peer reviews.

Precision: The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

Pre-Design Phase Commissioning: Commissioning tasks performed prior to the commencement of design activities that includes project programming and the development of the commissioning process for the project

Pre-Functional Checklist (PFC): A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.

Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

Procedure or Protocol: A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.

Range: The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.

Resolution: This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.

Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.

Special System Inspections: Inspections required by a local code authority prior to occupancy and are not normally a part of the commissioning process.

Static Tests: Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.

Start Up Tests: Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.

Systems Manual: A system-focused composite document that includes all information required for the owners operators to operate the systems.

Test Procedure: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

Testing: The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.

Testing, Adjusting, and Balancing (TAB): A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

Thermal Scans: Thermographic pictures taken with an Infrared Thermographic Camera. Thermographic pictures show the relative temperatures of objects and surfaces and are used to identify leaks, thermal bridging, thermal intrusion, electrical overload conditions, moisture containment, and insulation failure.

Training Plan: A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.

Trending: Monitoring over a period of time with the building automation system.

Unresolved Commissioning Issue: Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. Validation: The process by which work is verified as complete and operating correctly:

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes follow-up on verification of system performance, measurement and verification tasks and assistance in identifying warranty issues and enforcing warranty provisions of the construction contract.

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

1.7 SYSTEMS TO BE COMMISSIONED

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

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

Systems To Be Commissioned	
System	**Description**
HVAC	
Noise and Vibration Control	Noise and vibration levels for critical equipment such as Air Handler and fans that will be commissioned as part of the system commissioning
Direct Digital Control System	Operator Interface Computer, Operator Work Station (including graphics, point mapping, trends, alarms), Network Communications Modules and Wiring, Integration Panels. [DDC Control panels will be commissioned with the systems controlled by the panel]
HVAC Air Handling Systems	Air handling Units, packaged rooftop AHU, Outdoor Air conditioning units, humidifiers, DDC control panels
HVAC Ventilation/Exhaust Systems	General exhaust, toilet exhaust, laboratory exhaust, isolation exhaust, room pressurization control systems

HVAC Terminal Unit Systems**	VAV Terminal Units, CAV terminal units, fan coil units, fin-tube radiation, unit heaters
Humidity Control Systems	Humidifiers, de-humidifiers, controls, interface with facility DDC
Integrated Systems Tests	
Loss of Power Response	Loss of power to building, loss of power to campus, restoration of power to building, restoration of power to campus.
Fire Alarm Response	Integrated System Response to Fire Alarm Condition and Return to Normal
Table Notes	

1.8 COMMISSIONING TEAM

A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.

B. Members Appointed by Contractor:

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

C. Members Appointed by VA:

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

1.9 VA'S COMMISSIONING RESPONSIBILITIES

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

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

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

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

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.

B. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.

C. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

1. Participate in commissioning coordination meetings.
2. Conduct operation and maintenance training sessions in accordance with approved training plans.
3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with

entity responsible for system and equipment installation, recommend corrective action.

5. Review and comment on commissioning documentation.
6. Participate in meetings to coordinate Systems Functional Performance Testing.
7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
8. Provide information to the Commissioning Agent for developing commissioning plan.
9. Participate in training sessions for VA's operation and maintenance personnel.
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.

C. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.

D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.

E. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.

F. Coordinate Systems Functional Performance Testing schedule with the Contractor.

G. Witness selected systems startups.

H. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.

I. Witness and document Systems Functional Performance Testing.

J. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

K. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.

L. Prepare the Final Commissioning Report.

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

N. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

1.12 COMMISSIONING DOCUMENTATION

A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
3. Identification of systems and equipment to be commissioned.
4. Schedule of Commissioning Coordination meetings.

5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training.
9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
12. Preliminary Systems Functional Performance Test procedures.

B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems,

equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.

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

1. Creating a Commissioning Issues Log Entry:
   a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
   b. Assign a descriptive title for the issue.
   c. Identify date and time of the issue.
   d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.

e. Identify system, subsystem, and equipment to which the issue applies.
f. Identify location of system, subsystem, and equipment.
g. Include information that may be helpful in diagnosing or evaluating the issue.
h. Note recommended corrective action.
i. Identify commissioning team member responsible for corrective action.
j. Identify expected date of correction.
k. Identify person that identified the issue.

2. Documenting Issue Resolution:
a. Log date correction is completed or the issue is resolved.
b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
c. Identify changes to the Contract Documents that may require action.
d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
e. Identify person(s) who corrected or resolved the issue.
f. Identify person(s) verifying the issue resolution.

G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.

2. Commissioning plan.
3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
5, Commissioning Issues Log.
6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

H. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:
1. Documentation of deferred and off season test(s) results.
2. Completed Systems Functional Performance Test Procedures for off season test(s).
3. Documentation that unresolved system performance issues have been resolved.
4. Updated Commissioning Issues Log, including status of unresolved issues.
5. Identification of potential Warranty Claims to be corrected by the Contractor.

I. Systems Manual: The Commissioning Agent will gather required information and compile the Systems Manual. The Systems Manual will include, but is not limited to, the following:
1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
2. Reference to Final Commissioning Plan.
3. Reference to Final Commissioning Report.
4. Approved Operation and Maintenance Data as submitted by the Contractor.

1.13 SUBMITTALS

A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included

as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:

1. The Commissioning Team: A list of commissioning team members by organization.
2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).
3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system’s testing.

B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor’s project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The

Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.

C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.

D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.

E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.

F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA Resident Engineer with copies to the Contractor and Architect.

G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.

H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.

I. Data for Commissioning:

1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

1.14 COMMISSIONING PROCESS

A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.

B. Within 10 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.

C. Within 20 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

1.15 QUALITY ASSURANCE

A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.16 COORDINATION

A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All

commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.

C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.

D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.

F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing will

be identified in the detailed System Functional Performance Test Procedure prepared by the Commissioning Agent.

B. Data logging equipment and software required to test equipment shall be provided by the Contractor.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 °C (1.0 °F) and a resolution of + or - 0.1 °C (0.2 °F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

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

Construction Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = Resident Engineer					P = Participate
		A/E = Design Arch/Engineer					A = Approve
		PC = Prime Contractor					R = Review
		O&M = Gov't Facility O&M					O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Construction Commissioning Kick Off meeting	L	A	P	P	O	
	Commissioning Meetings	L	A	P	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support the OPR and BOD.	L	A	P	P	N/A	
Cx Plan & Spec	Final Commissioning Plan	L	A	R	R	O	
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	

Construction Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					P = Participate A = Approve R = Review O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

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

Acceptance Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					P = Participate A = Approve R = Review O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	P	P	O	

Acceptance Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					P = Participate A = Approve R = Review O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	L	P	P	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Training Plan Review	L	A	R	R	R	
	Warranty Review	L	A	R	R	O	
	Review TAB Report	L	A	R	R	O	
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	S	R	P	P	
Reports and	Status Reports	L	A	R	R	O	

Acceptance Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Logs	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	

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

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

3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

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

d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.

3. Sensor and Actuator Calibration
   a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 21, Division 22, Division 23, Division 26, Division 27, and Division 28 specifications.
   b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
4. Execution of Equipment Startup
   a. Four weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
   b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
   c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
   d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.

B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall

correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.

C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

3.4 PHASED COMMISSIONING

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

3.5 DDC SYSTEM TRENDING FOR COMMISSIONING

A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.

B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.

1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
2. Priority level alarms are to be printed to a printer which is connected to the Operator’s Workstation located within the engineer’s office. Additionally, Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.
3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report

automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.

D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Resident Engineer and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the Resident Engineer. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the Resident Engineer, prior to the execution of Systems Functional Performance Testing.
2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.

3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

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

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Final Filter Status	AI	None	None	None	N/A		
SA Flow	AI	15 Min	24 hours	3 days	C	±10% from SP	10 min
OA Supply Temp	AI	15 Min	24 hours	3 days	P	±5°F from SP	10 min
RA Supply Temp	AI	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
RA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
Duct Pressure	AI	15 Min	24 hours	3 days	C	±25% from SP	6 min
Supply Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Return Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 Min
High Static Status	DI	COV	24 hours	3 days	P	True	1 min
Fire Alarm Status	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat	DI	COV	24 hours	3 days	C	True	10 min
Fire/Smoke Damper Status	DI	COV	24 hours	3 days	P	Closed	1 min
Emergency AHU Shutdown	DI	COV	24 hours	3 days	P	True	1 min
Exhaust Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
OA Alarm	DI	COV	24 hours	3 days	C	True	10 min
High Static Alarm	DI	COV	24 hours	3 days	C	True	10 min
Power Failure	DI	COV	24 hours	3 days	P	True	1 min
Supply Fan Speed	AO	15 Min	24 hours	3 days	N/A		
Return Fan Speed	AO	15 Min	24 hours	3 days	N/A		

Dual-Path Air Handling Unit Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
RA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AO	15 Min	24 hours	3 days	N/A		

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

Unit Heater Trending and Alarms							
Point	**Type**	**Trend Interval**	**Operational Trend Duration**	**Testing Trend Duration**	**Alarm Type**	**Alarm Range**	**Alarm Delay**
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
Heating Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Unit Heater ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

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

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

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

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative

constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.

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

3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

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

B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about

equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.

D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms developed by the Commissioning Agent will include, but not be limited to, the following information:
   1. System and equipment or component name(s)
   2. Equipment location and ID number
   3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment
   4. Date
   5. Project name
   6. Participating parties
   7. A copy of the specification section describing the test requirements
   8. A copy of the specific sequence of operations or other specified parameters being verified
   9. Formulas used in any calculations
   10. Required pretest field measurements
   11. Instructions for setting up the test.
   12. Special cautions, alarm limits, etc.
   13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
   14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
   15. A section for comments.
   16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.

E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe

performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.

1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.
5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.

G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.

H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days’ notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance

Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The Commissioning Agent will witness and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled-out forms with the O&M manual data.

B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
   a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the

Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor's response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.

b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.

5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
   a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
   b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.
   c. The Commissioning Agent will document the resolution process.
   d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance

specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:

1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

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

3.8 DEFERRED TESTING

A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests shall be conducted in the same manner as the seasonal tests as soon as

possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.

B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent will review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent will convene a training preparation conference to include VA's Resident Engineer, VA’s Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.

B. The Contractor shall provide training and demonstration as required by other Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 sections. The Training and Demonstration shall include, but is not limited to, the following:

1. Review the Contract Documents.
2. Review installed systems, subsystems, and equipment.
3. Review instructor qualifications.
4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Review and discuss locations and other facilities required for instruction.
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.

9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
   1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
   2. Qualification Data: Submit qualifications for facilitator and/or instructor.
   3. Attendance Record: For each training module, submit list of participants and length of instruction time.
   4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

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

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

F. Instruction Program:
   1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
      a. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.

b. HVAC instrumentation and controls.

G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participants are expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   H, Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project Record Documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.

d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

H. Training Execution:
1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble

training modules into a combined training manual. Set up instructional equipment at instruction location.

2. Instruction:
   a. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
      2) The VA will furnish an instructor to describe VA's operational philosophy.
      3) The VA will furnish the Contractor with names and positions of participants.
3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.
4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.
5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

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SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies demolition and removal of portions of buildings 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. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.

E. Infectious Control: Section 01 35 26, SAFETY REQUIREMENTS.

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 STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS.

C. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.

D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not

limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.

E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
   1. No wall or part of wall shall be permitted to fall outwardly from structures.
   3. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
   4. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.

F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the COR. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have the COR's approval.

G. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

H. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS and Section 01 35 26, SAFETY REQUIREMENTS.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DEMOLITION:

A. Completely demolish and remove portions of buildings and structures, including all appurtenances related or connected thereto.

B. Debris, including brick, concrete, stone, metals, and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR.

C. Remove and legally dispose of all materials. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. The removal of hazardous material shall be referred to Hazardous Materials specifications.

3.2 CLEAN-UP:

A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to the COR. 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.

3.3 HAZARDOUS MATERIALS:

A. Discovery of any suspected lead or asbestos containing material shall result in the contractor stopping work in the area and reporting the discovery immediately to the Engineering Office or one of the contact persons indicated above. Engineering Service shall then evaluate the suspect material and if it contains lead or asbestos shall arrange for the removal.

B. Contractors shall maintain and provide to the VA Project Engineer MSDS’s for products used during construction which shall explain the labeling system and all other required information. Report any discovery of an existing hazardous material to Engineering Service, (ext. 3361).

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:

A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by Resident Engineer. For all other testing, refer to Section 01 45 29 Testing Laboratory Services.

B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology. Accompany request for approval of testing agency with a copy of Report of Latest Inspection of Laboratory Facilities by CCRL.

C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.4 TOLERANCES:

A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).

B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.

C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and - 6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).

D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:

1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.

2. Maximum elevation change which may occur within 600 mm (2 feet) of any column or wall element is 6 mm (0.25 inches).
3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 1500 mm (5 feet).

1.5 REGULATORY REQUIREMENTS:

A. ACI SP-66 – ACI Detailing Manual.
B. ACI 318 - Building Code Requirements for Reinforced Concrete.
C. ACI 301 – Standard Specifications for Structural Concrete.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
B. Shop Drawings: Reinforcing steel: Complete shop drawings
C. Mill Test Reports:
   1. Reinforcing Steel.
   2. Cement.
D. Manufacturer's Certificates:
   1. Abrasive aggregate.
   2. Lightweight aggregate for structural concrete.
   3. Air-entraining admixture.
   4. Chemical admixtures, including chloride ion content.
   5. Waterproof paper for curing concrete.
   6. Liquid membrane-forming compounds for curing concrete.
   7. Non-shrinking grout.
   8. Liquid hardener.
   9. Expansion joint filler.
   10. Adhesive binder.
E. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology and copy of report of latest CCRL, Inspection of Laboratory.
F. Test Report for Concrete Mix Designs: Trial mixes including water-cement fly ash ratio curves, concrete mix ingredients, and admixtures.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.

B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement and fly ash in separate suitable bins.

C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

1.8 PRE-CONCRETE CONFERENCE:

A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.

B. Agenda: Includes but is not limited to:

1. Submittals.
2. Coordination of work.
3. Availability of material.
4. Concrete mix design including admixtures.
5. Methods of placing, finishing, and curing.
6. Finish criteria required to obtain required flatness and levelness.
7. Timing of floor finish measurements.
8. Material inspection and testing.

C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; lightweight aggregate manufacturer; admixture manufacturers; Resident Engineer; Consulting Engineer; Department of Veterans Affairs retained testing laboratories for concrete testing and finish (F-number) verification.

D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

1.10 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. American Concrete Institute (ACI):

117-10 .....Specifications for Tolerances for Concrete Construction and Materials and Commentary

211.1-91(R2009) .....Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

211.2-98(R2004) .....Standard Practice for Selecting Proportions for Structural Lightweight Concrete

214R-11 .....Guide to Evaluation of Strength Test Results of Concrete

301-10 .....Standard Practice for Structural Concrete

304R-00(R2009) .....Guide for Measuring, Mixing, Transporting, and Placing Concrete

305.1-06 .....Specification for Hot Weather Concreting

306.1-90(R2002) .....Standard Specification for Cold Weather Concreting

308.1-11 .....Specification for Curing Concrete

309R-05 .....Guide for Consolidation of Concrete

318-11 .....Building Code Requirements for Structural Concrete and Commentary

347-04 .....Guide to Formwork for Concrete

SP-66-04 .....ACI Detailing Manual

C. American National Standards Institute and American Hardboard Association (ANSI/AHA):

A135.4-2004 .....Basic Hardboard

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

A82/A82M-07 .....Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

A185/185M-07 .....Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A615/A615M-09 .....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

A653/A653M-11 .....Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process

A706/A706M-09 .....Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

A767/A767M-09 .....Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement

A775/A775M-07 .....Standard Specification for Epoxy Coated Reinforcing Steel Bars

A820-11 .....Standard Specification for Steel Fibers for Fiber Reinforced Concrete

C31/C31M-10 .....Standard Practice for Making and Curing Concrete Test Specimens in the field

C33/C33M-11A .....Standard Specification for Concrete Aggregates

C39/C39M-12 .....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C94/C94M-12 .....Standard Specification for Ready Mixed Concrete

C143/C143M-10 .....Standard Test Method for Slump of Hydraulic Cement Concrete

C150-11 .....Standard Specification for Portland Cement

C171-07 .....Standard Specification for Sheet Materials for Curing Concrete

C172-10 .....Standard Practice for Sampling Freshly Mixed Concrete

C173-10... .....Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-07 .....Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

C231-10 .....Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260-10 .....Standard Specification for Air Entraining Admixtures for Concrete

C309-11 .....Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

C494/C494M-11 .....Standard Specification for Chemical Admixtures for Concrete

C618-12 .....Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C666/C666M-03(R2008) ...Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C881/C881M-10 .....Standard Specification for Epoxy Resin Base Bonding Systems for Concrete

C1107/1107M-11 .....Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

C1315-11 .....Standard Specification for Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete

D6-95(R2011) .....Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds

D297-93(R2006) .....Standard Methods for Rubber Products Chemical Analysis

D412—06AE2 .....Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

D1751-04(R2008) .....Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

D4263-83(2012) .....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

D4397-10 .....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

E1155-96(R2008) .....Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers

F1869-11 .....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

E. American Welding Society (AWS):

D1.4/D1.4M-11 .....Structural Welding Code - Reinforcing Steel

F. Concrete Reinforcing Steel Institute (CRSI):

Handbook 2008

H. U. S. Department of Commerce Product Standard (PS):

PS 1 .....Construction and Industrial Plywood

PS 20 .....American Softwood Lumber

PART 2 – PRODUCTS:

2.1 FORMS:

A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.

B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.

C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.

D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.

E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 KPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.

F. Form Lining:

1. Hardboard: ANSI/AHA A135.4, Class 2 with one (S1S) smooth side)
2. Plywood: Grade B-B Exterior (concrete-form) not less than 6 mm (1/4 inch) thick.
3. Plastic, fiberglass, or elastomeric capable of reproducing the desired pattern or texture.

G. Concrete products shall comply with following standards for biobased materials:

Material Type	Percent by Weight
Concrete Penetrating Liquid	79 percent biobased material
Concrete form Release Agent	87 percent biobased material
Concrete Sealer	11 percent biobased material

The minimum-content standards are based on the weight (not the volume) of the material.

H. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS:

A. Portland Cement: ASTM C150 Type I, II, or I/II.

B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.

C. Coarse Aggregate: ASTM C33.

1. Size 67 or Size 467 may be used for footings and walls over 300 mm (12 inches) thick.
2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.

D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150 µm (No. 100) sieve.

E. Mixing Water: Fresh, clean, and potable.

F. Admixtures:

1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
5. Air Entraining Admixture: ASTM C260.
8. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
9. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.

G. Vapor Barrier: ASTM D4397, //0.25 mm (10 mil)//0.38 mm (15 mil).

H. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.

I. Welded Wire Fabric: ASTM A185.

J. Epoxy Coated Reinforcing Bars: ASTM A775.

K. Cold Drawn Steel Wire: ASTM A82.

L. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.

M. Expansion Joint Filler: ASTM D1751.

N. Sheet Materials for Curing Concrete: ASTM C171.

O. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315.Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.

P. Moisture Vapor Emissions & Alkalinity Control Sealer: 100% active colorless aqueous siliconate solution concrete surface.

1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
2. MVE 15-Year Warranty:
   a. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Moisture Vapor Emissions & Alkalinity Control Sealer according to manufacturer's instruction, sealer manufacturer shall warrant the floor covering system against failure due to moisture vapor migration or moisture-born contaminates for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminates.

Q. Non-Shrink Grout:

1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.

2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under a 450 mm x 900 mm (18 inch by 36 inch) base plate.

R. Adhesive Binder: ASTM C881.

S. Porous Backfill: Crushed stone or gravel graded from 25 mm to 20 mm (1 inch to 3/4 inch).

T. Fibers:

1. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and 0.9 kg/m^3 (1.5 lb. per cubic yard). Product shall have a UL rating.

U. Epoxy Joint Filler: Two component, 100 percent solids compound, with a minimum shore D hardness of 50.

V. Bonding Admixture: Non-rewettable, polymer modified, bonding compound.

2.3 CONCRETE MIXES:

A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per m^3 (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement -fly ash ratio, and consistency of each cylinder in terms of slump.
3. Prepare a curve showing relationship between water-cement // -fly ash// ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
4. If the field experience method is used, submit complete standard deviation analysis.

B. Fly Ash Testing: Submit certificate verifying conformance with ASTM 618 initially with mix design and for each truck load of fly ash delivered from source. Submit test results performed within 6 months of submittal date. Notify Resident Engineer immediately when change in source is anticipated.

1. Testing Laboratory used for fly ash certification/testing shall participate in the Cement and Concrete Reference Laboratory (CCRL) program. Submit most recent CCRL inspection report.

C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Resident Engineer or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash , providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. Resident Engineer may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and fly ash and approval of design mix.

D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m^3 (lbs/c. yd)	Max. Water Cement Ratio
35 (5000)[1,3]	375 (630)	0.45	385 (650)	0.40
30 (4000)[1,3]	325 (550)	0.55	340 (570)	0.50
25 (3000)[1,3]	280 (470)	0.65	290 (490)	0.55
25 (3000)[1,2]	300 (500)	*	310 (520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

E. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II - MAXIMUM SLUMP, MM (INCHES)*

Type of Construction	Normal Weight Concrete	Lightweight Structural Concrete
Reinforced Footings and Substructure Walls	75mm (3 inches)	75 mm (3 inches)
Slabs, Beams, Reinforced Walls, and Building Columns	100 mm (4 inches)	100 mm (4 inches)

F. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 225 mm (9 inches). The concrete shall arrive at the job site at a slump of 50 mm to 75 mm (2 inches to 3 inches), and 75 mm to 100 mm (3 inches to 4 inches) for lightweight concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Determine air content by either ASTM C173 or ASTM C231.

TABLE III - TOTAL AIR CONTENT

FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)

Nominal Maximum Size of Total Air Content	Coarse Aggregate, mm (Inches) Percentage by Volume
10 mm (3/8 in).6 to 10	13 mm (1/2 in).5 to 9
20 mm (3/4 in).4 to 8	25 mm (1 in).3-1/2 to 6-1/2
40 mm (1 1/2 in).3 to 6	

H. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.

I. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).

J. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III or Table IV.

K. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, Resident Engineer may require any one or any combination of the following corrective actions, at no additional cost to the Government:

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, Resident Engineer may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, Resident Engineer may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.

5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Resident Engineer.

2.4 BATCHING AND MIXING:

A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by Resident Engineer. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 38^{0}C (100 degrees Fahrenheit). Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
-1. degrees to 4.4 degrees C (30 degrees to 40 degrees F)	15.6 degrees C (60 degrees F.)
-17 degrees C to -1.1 degrees C (0 degrees to 30 degrees F.)	21 degrees C (70 degrees F.)

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the Resident Engineer for consultation during batching, mixing, and placing operations of
2. lightweight structural concrete. Services will be required until field controls indicate that concrete of required quality is being furnished. Representative shall be thoroughly familiar with the structural lightweight aggregate, adjustment and control of mixes to produce concrete of required quality. Representative shall assist and advise Resident Engineer.

PART 3 – EXECUTION

3.1 FORMWORK:

A. General:

1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and Resident Engineer approves their reuse.
2. Provide forms for concrete footings unless Resident Engineer determines forms are not necessary.

3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.

B. Treating and Wetting: Treat or wet contact forms as follows:
   1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
   2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
   3. Use sealer on reused plywood forms as specified for new material.

C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.

D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.

E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to same backing board. Nail lining at not over 200 mm (8 inches) on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.

F. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.
   1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.

2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

G. Inserts, Sleeves, and Similar Items: Flashing reglets, steel strips, masonry ties, anchors, wood blocks, nailing strips, grounds, inserts, wire hangers, sleeves, drains, guard angles, forms for floor hinge boxes, inserts or bond blocks for elevator guide rails and supports, and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned, and built into construction, and maintained securely in place.

1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
3. Do not install sleeves in beams, joists or columns except where shown or permitted by Resident Engineer. Install sleeves in beams, joists, or columns that are not shown, but are permitted by the Resident Engineer, and require no structural changes, at no additional cost to the Government.
4. Minimum clear distance of embedded items such as conduit and pipe are at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
5. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.

H. Construction Tolerances:

1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering

individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT:

A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.

B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.

1. Place reinforcing bars accurately and tie securely at intersections and splices with 1.6 mm (16 gauge) black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 150 mm (6 inches) in slabs on grade.
3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.

C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.

D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:

1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
3. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and

threaded sleeve. Exposed threads and swaging in the field not permitted.

a. Initial qualification: In the presence of Resident Engineer, make three test mechanical splices of each bar size proposed to be spliced. Department of Veterans Affairs retained testing laboratory will perform load test.

b. During installation: Furnish, at no additional cost to the Government, one companion (sister) splice for every 50 splices for load testing. Department of Veterans Affairs retained testing laboratory will perform the load test.

E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by Resident Engineer.

F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.

G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER:

A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.

1. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
2. Vapor barrier joints lapped 150 mm (6 inches) and sealed with compatible waterproof pressure-sensitive tape.
3. Patch punctures and tears.

3.4 SLABS RECEIVING RESILIENT COVERING

A. Slab shall be allowed to cure for 6 weeks minimum prior to placing resilient covering. After curing, slab shall be tested by the Contractor for moisture in accordance with ASTM D4263 or ASTM F1869. Moisture content shall be less than 3 pounds per 1000 sf prior to placing covering.

B. In lieu of curing for 6 weeks, Contractor has the option, at his own cost, to utilize the Moisture Vapor Emissions & Alkalinity Control Sealer as follows:

1. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for

concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.

3.5 CONSTRUCTION JOINTS:

A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Resident Engineer.

3.6 EXPANSION JOINTS AND CONTRACTION JOINTS:

A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

B. Install polyvinyl chloride or rubber water seals, as shown in accordance with manufacturer's instructions, to form continuous watertight seal.

C. Provide contraction (control) joints in floor slabs as indicated on the contract drawings. Joints shall be either formed or saw cut, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.7 PLACING CONCRETE:

A. Preparation:

1. Remove hardened concrete, wood chips, shavings and other debris from forms.
2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.

1. Preparing surface for applied topping:

a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.

b. Broom clean and keep base slab wet for at least four hours before topping is applied.

c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of Resident Engineer.

D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.

1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
3. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.

E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.

1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.8 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.9 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.10 PROTECTION AND CURING:

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms

continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage 10m^2/L (400 square feet per gallon) on steel troweled surfaces and 7.5m^2/L (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.12 CONCRETE SURFACE PREPARATION:

A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely

through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.

C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.13 CONCRETE FINISHES:

A. Vertical and Overhead Surface Finishes:

1. Unfinished areas: Vertical and overhead concrete surfaces exposed in pipe basements, elevator and dumbwaiter shafts, pipe spaces, pipe trenches, above suspended ceilings, manholes, and other unfinished areas will not require additional finishing.
2. Interior and exterior exposed areas to be painted: Remove fins, burrs and similar projections on surfaces flush, and smooth by mechanical means approved by Resident Engineer, and by rubbing lightly with a fine abrasive stone or hone. Use ample water during rubbing without working up a lather of mortar or changing texture of concrete.
3. Interior and exterior exposed areas finished: Give a grout finish of uniform color and smooth finish treated as follows:
   a. After concrete has hardened and laitance, fins and burrs removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone stone.
   b. Apply grout composed of one part of Portland cement, one part fine sand, smaller than a 600 µm (No. 30) sieve. Work grout into surface of concrete with cork floats or fiber brushes until all pits, and honeycombs are filled.
   c. After grout has hardened slightly, but while still plastic, scrape grout off with a sponge rubber float and, about 1 hour later, rub concrete vigorously with burlap to remove any excess grout remaining on surfaces.
   d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish of area in same day. Make limits of finished areas at natural breaks in wall surface. Leave no grout on concrete surface overnight.

4. Textured: Finish as specified. Maximum quantity of patched area 0.2 m^2 (2 square feet) in each 93 m^2 (1000 square feet) of textured surface.

B. Slab Finishes:

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.
2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds.
3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull

floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.

6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.
7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.
10. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by Resident Engineer from sample panel.
11. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
    a. Areas covered with carpeting, or not specified otherwise in b. below:
        1) Slab on Grade:

a) Specified overall value F_F 25/F_L 20

b) Minimum local value F_F 17/F_L 15

4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.

b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:

1) Slab on grade:

a) Specified overall value FF 36/FL 20

b) Minimum local value FF 24/FL 15

4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.

c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.

d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.

12. Measurements

a. Department of Veterans Affairs retained testing laboratory will take measurements as directed by Resident Engineer, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by Department of Veterans Affairs retained testing laboratory.

b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist

with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

13. Acceptance/ Rejection:
    a. If individual slab section measures less than either of specified minimum local F_F/F_L numbers, that section shall be rejected, and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
    b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected, and remedial measures shall be required.
14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

3.14 SURFACE TREATMENTS:

A. Use on exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish .

B. Liquid Densifier/Sealer: Apply in accordance with manufacturer's directions just prior to completion of construction.

C. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Broadcast aggregate uniformly over concrete surface at rate of application of 8% per 1/10th m^2 (7.5 percent per square foot) of area. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water to slightly expose abrasive aggregate.

3.16 RESURFACING FLOORS:

Remove existing flooring areas to receive resurfacing to expose existing structural slab and extend not less than 25 mm (1 inch) below new finished floor level. Prepare exposed structural slab surface by roughening, broom cleaning, and dampening. Apply specified bonding grout. Place topping while the bonding grout is still tacky.

3.17 RETAINING WALLS:

A. Use air-entrained concrete.

B. Expansion and contraction joints, waterstops, weep holes, reinforcement and railing sleeves installed and constructed as shown.

C. Exposed surfaces finished to match adjacent concrete surfaces, new or existing.

D. Place porous backfill as shown.

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SECTION 04 05 13
MASONRY MORTARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Masonry mortar installed by other sections.

1.2 RELATED REQUIREMENTS

A. Mortar used in Section:

1. Section 04 20 00, UNIT MASONRY.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. C40/C40M-11 - Organic Impurities in Fine Aggregates for Concrete.
2. C91/C91M-12 - Masonry Cement.
3. C144-11 -Aggregate for Masonry Mortar.
4. C150/C150M-15 - Portland Cement.
5. C207-06(2011) - Hydrated Lime for Masonry Purposes.
6. C270-14a - Mortar of Unit Masonry.
7. C595/C595M-15e1 - Blended Hydraulic Cements.
8. C780-15 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
9. C979/C979M-10 - Pigments for Integrally Colored Concrete.
10. C1329/C1329M-15 - Mortar Cement.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.

C. Test Reports: Certify each product complies with specifications.

1. Mortar.
2. Admixtures.

D. Certificates: Certify each product complies with specifications.

1. Portland cement.
2. Masonry cement.
3. Mortar cement.
4. Hydrated lime.
5. Fine aggregate.
6. Color admixture.

E. Qualifications: Substantiate qualifications comply with specifications.

1. Testing laboratory.

1.5 QUALITY ASSURANCE

A. Preconstruction Testing:
   1. Engage independent testing laboratory to tests and submit reports.
      a. Deliver samples to laboratory in number and quantity required for testing.
   2. Test mortar and materials specified.
   3. Mortar:
      a. Test for compressive strength and water retention according to ASTM C270.
      b. Minimum Mortar compressive strengths 28 days:
         1) Type M: 17.2 MPa (2,500 psi).
         2) Type S: 12.4 MPa (1,800 psi).
         3) Type N: 5.1 MPa (750 psi).
   4. Non-Staining Cement: Test for water soluble alkali.
      a. Water Soluble Alkali: Maximum 0.03 percent.
   5. Sand: Test for deleterious substances, organic impurities, soundness and grading.

1.6 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.

1.7 STORAGE AND HANDLING

A. Store masonry materials under waterproof covers on planking clear of ground.
   1. Protect loose, bulk materials from contamination.
B. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hydrated Lime: ASTM C207, Type S.
B. Aggregate for Masonry Mortar: ASTM C144 and as follows:
   1. Light colored sand for mortar for laying face brick.

2. Test sand for color value according to ASTM C40/C40M. Sand producing color darker than specified standard is unacceptable.

C. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, IP.

D. Masonry Cement: ASTM C91/C91M. Type N, S, Or M.

1. Use white masonry cement whenever white mortar is specified.

E. Mortar Cement: ASTM C1329/C1329M, Type N, S or M.

F. Portland Cement: ASTM C150/C150M, Type I.

1. Use white Portland cement wherever white mortar is specified.

G. Pigments: ASTM C979/C979M; inorganic, inert, mineral pigments only, unaffected by atmospheric conditions, nonfading, alkali resistant, and water insoluble.

H. Water: Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer and from one production run.

2.3 MIXES

A. Pointing Mortar for New Work:

1. For Cast Stone or Precast Concrete: Proportion by volume; one-part white Portland cement, two parts white sand, and 1/5-part hydrated lime.

B. Masonry Mortar: ASTM C270.

1. Admixtures:

a. Do not use mortar admixtures, and color admixtures unless approved by Contracting Officer's Representative.

b. Do not use antifreeze compounds.

C. Colored Mortar:

1. Maintain uniform mortar color for exposed work, throughout.

2. Match existing mortar color.

3. Alteration Work Mortar Color: Match existing mortar unless specified otherwise.

D. Color Admixtures:

1. Proportion as specified by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

3.2 MIXING

A. Measure ingredients by volume using known capacity container.

B. Mix for 3 to 5 minutes in a mechanically operated mortar mixer.

C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.

D. Mortar Stiffened Because of Water Loss Through Evaporation:

1. Re-temper by adding water to restore to proper consistency and workability.
2. Discard mortar reaching initial set or unused within two hours of mixing.

E. Pointing Mortar:

1. Mix dry ingredients with enough water to produce damp mixture of workable consistency retaining shape when formed into ball.
2. Allow mortar to stand in dampened condition for 60 to 90 minutes.
3. Add water to bring mortar to a workable consistency before use.

3.3 MORTARING

A. Type M Mortar: Use for precast concrete panels, and parging below grade.

B. Type S Mortar: Use for masonry containing vertical reinforcing bars (non-engineered) masonry below grade.

C. Brick Veneer Over Frame Back Up Walls: Use Type S Portland cement-lime mortar.

D. Type N Mortar: Use for other masonry work.

3.4 FIELD QUALITY CONTROL

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

1. Take and test samples during progress of work according to ASTM C780.

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SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes masonry unit assemblies for:
   1. Exterior walls.
   2. Interior walls and partitions.
   3. Infill at abandoned masonry openings.

1.2 RELATED REQUIREMENTS

A. Sealants and Sealant Installation: Section 07 92 00, JOINT SEALANTS.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.
B. American Concrete Institute (ACI):
   1. 315-99 - Details and Detailing of Concrete Reinforcement.
   2. 530.1/ASCE 6/TMS 602-13 - Specification for Masonry Structures.
C. ASTM International (ASTM):
   1. A615/A615M-15ae1 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   2. A951/A951M-14 - Steel Wire for Masonry Joint Reinforcement.
   3. A1064/A1064M-15 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. C34-13 - Structural Clay Load-Bearing Wall tile.
   5. C55-14a - Concrete Building Brick.
   6. C56-13 - Structural Clay Nonloadbearing Tile.
   7. C62-13a - Building Brick (Solid Masonry Units Made from Clay or Shale).
   8. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
   9. C90-14 - Load-Bearing Concrete Masonry Units.
   10. C126-15 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
   11. C216-15 - Facing Brick (Solid Masonry Units Made from Clay or Shale).
   12. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
   13. C744-14 - Prefaced Concrete and Calcium Silicate Masonry Units.
   14. D1056-14 - Flexible Cellular Materials - Sponge or Expanded Rubber.
   15. D2240-05(2010) - Rubber Property-Durometer Hardness.
   16. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.
D. American Welding Society (AWS):
   1. D1.4/D1.4M-11 - Structural Welding Code - Reinforcing Steel.

E. Brick Industry Association (BIA):
   1. TN 11B-88 - Guide Specifications for Brick Masonry, Part 3.
F. Federal Specifications (Fed. Spec.):
   1. FF-S-107C(2) - Screws, Tapping and Drive.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Submittal Drawings:
   1. Fabrication, bending, and placement of reinforcing bars. Comply with ACI 315. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies.
C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.
D. Certificates: Certify products comply with specifications.
   1. Face brick.
   2. Solid and load-bearing concrete masonry units, including fire-resistant rated units.

1.5 QUALITY ASSURANCE

A. Welders and Welding Procedures Qualifications: AWS D1.4/D1.4M.

1.6 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.

1.7 STORAGE AND HANDLING

A. Store products above grade, protected from contamination.
B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Hot and Cold Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 UNIT MASONRY PRODUCTS

A. Brick:

1. Face Brick: Match existing color and texture.
    a. ASTM C216, Grade SW, Type FBS.
    b. Brick when tested according to ASTM C67: Classified slightly efflorescent or better.
    c. Size:
        1) Modular.
2. Building Brick: ASTM C62, Grade MW for backup and interior work; Grade SW where in contact with earth.
3. One Face Exposed: Grade S, Type I.
4. Two Faces Exposed: Grade S, Type II.

B. Concrete Masonry Units (CMU):

1. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.
    a. Unit Weight: Normal weight
    b. Fire rated units for fire rated partitions.
2. Sizes: Modular, 200 mm by 400 mm (8 inches by 16 inches) nominal face dimension; thickness as indicated on drawings.

C. Concrete Brick: ASTM C55.

2.2 ANCHORS, TIES, AND REINFORCEMENT

A. Steel Reinforcing Bars: ASTM A615/A615M; Grade 60, deformed bars.

B. Joint Reinforcement:

1. Form from wire complying with ASTM A951/A951M.
2. Hot dipped galvanized after fabrication.
3. Width of joint reinforcement 40 mm (1.6 inches) less than nominal thickness of masonry wall or partition.
4. Cross wires welded to longitudinal wires.
5. Joint reinforcement minimum 3000 mm (10 feet) long, factory cut.
6. Joint reinforcement with crimp formed drip is not acceptable.
7. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.

C. Adjustable Veneer Anchor for Framed Walls:

1. Two-piece, adjustable anchor and tie.
2. Anchor and tie may be either loop or angle type; provide only one type throughout.
3. Loop Type:

a. Anchor: Screw-on galvanized steel anchor strap 2.75 mm (0.11 inch) by 19 mm (3/4 inch) wide by 225 mm (9 inches) long, with 9 mm (0.35 inch) offset and 100 mm (4 inch) adjustment. Provide 5 mm (0.20 inch) hole at each end for fasteners.

b. Ties: Triangular tie, fabricated of 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Ties long enough to engage anchor and be embedded minimum 50 mm (2 inches) into bed joint of masonry veneer.

4. Angle Type:

a. Anchor: Minimum 2 mm (16 gage) thick galvanized steel angle shaped anchor strap. Provide hole in vertical leg for fastener. Provide hole near end of outstanding leg to suit upstanding portion of tie.

b. Tie: Fabricate from 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Form "L" shape to be embedded minimum 50 mm (2 inches) into the bed joint of masonry veneer and provide upstanding leg to fit through hole in anchor and be long enough to allow 50 mm (2 inches) of vertical adjustment.

D. Dovetail Anchors:

1. Corrugated steel dovetail anchors formed of 1.5 mm (0.06 inch) thick by 25 mm (1 inch) wide galvanized steel, 90 mm (3-1/2 inches) long where used to anchor 100 mm (4 inch) nominal thick masonry units, 140 mm (5-1/2 inches) long for masonry units more than 100 mm (4 inches) thick.

2. Triangular wire dovetail anchor 100 mm (4 inch) wide formed of 4 mm (9 gage) steel wire with galvanized steel dovetail insert. Anchor length to extend minimum 75 mm (3 inches) into masonry, 25 mm (1 inch) into 40 mm (1-1/2 inch) thick units.

3. Form dovetail anchor slots from 0.6 mm (0.02 inch) thick galvanized steel (with felt or fiber filler).

E. Individual Ties:

1. Rectangular ties: Form from 5 mm (3/16 inch) diameter galvanized steel rod to rectangular shape minimum 50 mm (2 inches) wide by sufficient length for ends of ties to extend within 25 mm (1 inch) of each face of wall. Ties that are crimped to form drip are not acceptable.

2. Adjustable Cavity Wall Ties:

a. Adjustable wall ties may be furnished at Contractor's option.

b. Two-piece type permitting up to 40 mm (1-1/2 inch) adjustment.
c. Form ties from 5 mm (3/16 inch) diameter galvanized steel wire.
d. Form one piece to rectangular shape 105 mm (4-1/8 inches) wide by length required to extend into bed joint 50 mm (2 inches).
e. Form other piece to 75 mm (3 inch) long by 75 mm (3 inch) wide shape, having 75 mm (3 inch) long bent section for engaging 105 mm (4-1/8 inch) wide piece to form adjustable connection.

F. Wall Ties, (Mesh or Wire):
1. Mesh wall ties formed of ASTM A1064/A1064M, W0.5, 2 mm, (0.08 inch) galvanized steel wire 13 mm by 13 mm (1/2 inch by 1/2 inch) mesh, 75 mm (3 inches) wide by 200 mm (8 inches) long.
2. Rectangular wire wall ties formed of W1.4, 3 mm, (0.12 inch) galvanized steel wire 50 mm (2 inches) wide by 200 mm (8 inches) long.

G. Adjustable Steel Beam Anchor:
1. Z or C type steel strap, 30 mm (1 1/4 inches) wide, 3 mm (1/8 inch) thick.
2. Flange hook minimum 38 mm (1 1/2 inches) long.
3. Length to embed in masonry minimum 50 mm (2 inches) in 100 mm (4 inch) nominal thick masonry and 100 mm (4 inches) in thicker masonry.
4. Bend masonry end minimum 40 mm (1 1/2 inches).

2.3 ACCESSORIES

A. Preformed Compressible Joint Filler:
1. Thickness and depth to fill joint.
2. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
3. Non-Combustible Type: ASTM C612, Type 5, Max. Temp.1800 degrees F.

B. Fasteners:
1. Concrete Nails: ASTM F1667, Type I, Style 11, 19 mm (3/4 inch) minimum length.
2. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
3. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

C. Welding Materials: AWS D1.4/D1.4M, type to suit application.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

B. Keep finish work free from mortar smears or spatters, and leave neat and clean.

C. Wall Openings:
   1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
   2. When items are not available when walls are built, prepare openings for subsequent installation.

D. Lintels:
   1. Use steel lintels, for openings greater than 1600 m (63 inches) wide, brick masonry openings, and elevator openings unless shown otherwise.
   2. Doors having overhead concealed door closers require steel lintel, and pocket for closer box.
   3. Lintel Bearing Length: Minimum 100 mm (8 inches) at both ends.

E. Before connecting new masonry with previously laid masonry, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

F. Structural Steel Encased in Masonry:
   1. Where structural steel is encased in masonry and voids between steel and masonry are filled with mortar, provide minimum 25 mm (1 inch) mortar free expansion space between masonry and steel by applying box board material to steel before masonry is laid.
   2. Do not install spacing material where steel is bearing on masonry or masonry is bearing on steel.

G. Wetting and Wetting Test:
   1. Test and wet brick and clay tile according to BIA TN 11B.
   2. Do not wet concrete masonry units or glazed structural facing tile before laying.

H. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

I. Construct formwork to conform to shape, line and dimensions indicated on drawings. Make sufficiently tight to prevent mortar, grout, or concrete leakage. Brace, tie and support formwork as required to maintain position and shape during construction and curing of reinforced masonry.

J. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other reasonable temporary construction loads.

K. Minimum Curing Times Before Removing Shores and Forms:

1. Girders and Beams: 10 days.
2. Slabs: 7 days.
3. Reinforced Masonry Soffits: 7 days.

3.2 INSTALLATION - ANCHORAGE

A. Veneer to Framed Walls:

1. Install adjustable veneer anchors.
2. Fasten anchor to stud through sheathing with self-drilling and tapping screw, one at both ends of loop type anchor.
3. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

B. Anchorage of Abutting Masonry:

1. Anchor interior 100 mm (4 inch) thick masonry partitions to exterior masonry walls with wall ties. Space ties at 600 mm (24 inches) maximum vertical intervals. Extend ties 100 mm (4 inches) minimum into masonry.
2. Anchor interior masonry bearing walls or interior masonry partitions over 100 mm (4 inches) thick to masonry walls with rigid wall anchors spaced at 400 mm (16 inch) maximum vertical intervals.
3. Anchor abutting masonry walls and partitions to concrete with dovetail anchors. Install dovetail slots vertically in concrete at centerline of abutting wall or partition. Locate dovetail anchors at 400 mm (16 inch) maximum vertical intervals. Secure anchors to existing wall with two 9 mm (3/8 inch) by 75 mm (3 inch) expansion bolts or two power-driven fasteners.
4. Anchor abutting interior masonry partitions to existing concrete and existing masonry construction, with adjustable wall ties. Extend ties minimum 100 mm (4 inches) into joints of new masonry. Fasten ties to existing concrete and masonry construction, with powder actuated drive pins, nail or other means that provides rigid anchorage. Install anchors at 400 mm (16 inch) maximum vertical intervals.

C. Masonry Furring:

1. Anchor masonry furring less than 100 mm (4 inches) nominal thick to masonry walls or to concrete with adjustable wall ties.

2. Space at maximum 400 mm (16 inches) on center in both directions.

D. Anchorage to Steel Beams or Columns:

1. Use adjustable beam anchors on each flange.
2. At columns weld steel rod to steel columns at 300 mm (12 inch) intervals, and place wire ties in masonry courses at 400 mm (16 inches) maximum vertically.

3.3 INSTALLATION - REINFORCEMENT

A. Joint Reinforcement:

1. Install joint reinforcement in CMU wythe of combination brick and CMU, cavity walls, and single wythe concrete masonry unit walls or partitions.
2. Reinforcing is acceptable in lieu of individual ties for anchoring brick facing to CMU backup in exterior masonry walls.
3. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.
4. Additional joint reinforcement is required in mortar joints at both 200 mm (8 inches) and 400 (16 inches) above and below windows, doors, louvers and similar openings in masonry.
5. Wherever brick masonry is backed up with stacked bond masonry, install multiple wythe joint reinforcement in every two courses of CMU backup, and in corresponding joint of facing brick.

B. Steel Reinforcing Bars:

1. Bond Beams:
   a. Form Bond beams of load-bearing concrete masonry units filled with grout and reinforced with two No. 15m (No. 5) reinforcing bars unless shown otherwise. Do not cut reinforcement.
   b. Brake bond beams only at expansion joints and at control joints, if shown.

3.4 INSTALLATION - BRICKWORK

A. Lay clay brick according to BIA TN 11B.

B. Laying:

1. Lay brick in one-half running bond with bonded corners, unless indicated otherwise. Match bond of existing building on alterations and additions.
2. Maintain bond pattern throughout.
3. Do not use brick smaller than half-brick at any angle, corner, break, and jamb.

4. Where length of cut brick is greater than one half length, maintain vertical joint location.
5. Lay exposed brickwork joints symmetrical about center lines of openings.
6. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
7. Lay brick for sills with wash and drip.
8. Build solid brickwork as required for anchorage of items.

C. Joints:
1. Exterior and Interior Joint Widths: Lay for three equal joints in 200 mm (8 inches) vertically, unless shown otherwise.
2. Rake joints for pointing with colored mortar when colored mortar is not full depth.

D. Weep Holes:
1. Install weep holes at 600 mm (24 inches) on center in bottom of vertical joints of exterior masonry veneer or cavity wall facing over foundations, bond beams, and other water stops in wall.
2. Form weep holes using wicks made of mineral fiber insulation strips turned up 200 mm (8 inches) in cavity. Anchor top of strip to backup to securely hold in place.

E. Exterior Walls:
1. Build with 100 mm (4 inches) of nominal thick facing brick, backed up with steel stud framed construction.
2. Construct solid brick jambs minimum 20 mm (0.81 inches) wide at exterior wall openings and at recesses, except where exposed concrete unit backup is shown.
3. Do not install full bonding headers.
4. Coordinate with building insulation for thickness of insulation and allowance of air space behind exterior wythe.

F. Cavity Walls:
1. Keep air space clean of mortar accumulations and debris.
2. Insulated Cavity Type Exterior Walls:
   a. Install insulation against cavity face of inner masonry wythe.
   b. Place insulation between rows of ties or joint reinforcing. Adhere insulation to masonry surface with a bonding agent as recommended by insulation manufacturer.
   c. Lay outer masonry wythe up with air space between insulation and masonry units.

3. Veneer Framed Walls:
   a. Build with 100 mm (4 inches) of face brick over sheathed stud wall with air space.
   b. Keep air space clean of mortar accumulations and debris.

3.5 INSTALLATION - CONCRETE MASONRY

A. Types and Uses:
1. Provide special concrete masonry shapes as required, including lintel and bond beam units.
2. Install concrete building brick only as filler in backup material where not exposed.
3. Construct fire resistance in fire rated partitions meeting fire ratings indicated on drawings.

B. Laying:
1. Lay concrete masonry units with 9 mm (3/8 inch) joints, with a bond overlap of minimum 1/4 of unit length, except where stack bond is indicated on drawings.
2. Do not wet concrete masonry units before laying.
3. Bond external corners of partitions by overlapping alternate courses.
4. Lay first course in a full mortar bed.
5. Set anchorage items as work progress.
6. Where ends of anchors, bolts, and other embedded items, project into voids of units, completely fill voids with mortar or grout.
7. Provide 6 mm (1/4 inch) open joint for sealant between existing construction and abutting masonry partitions.
8. Lay concrete masonry units with full face shell mortar beds and fill head joint beds for depth equivalent to face shell thickness.
9. Lay concrete masonry units so cores of units, that are to be filled with grout, are vertically continuous with joints of cross webs of such cores completely filled with mortar. Unobstructed core openings minimum 50 mm (2 inches) by 75 mm (3 inches).
10. Do not wedge masonry against steel reinforcing. Minimum 13 mm (1/2 inch) clear distance between reinforcing and masonry units.
11. Install deformed reinforcing bars of sizes indicated on drawings.
12. At time of placement, ensure steel reinforcement is free of loose rust, mud, oil, and other contamination capable of affecting bond.
13. Place steel reinforcement at spacing indicated on drawings before grouting.

14. Minimum clear distance between parallel bars: One bar diameter.
15. Hold vertical steel reinforcement in place vertically by centering clips, caging devices, tie wire, or other approved methods.
16. Support vertical bars near each end and at maximum 192 bar diameter on center.
17. Splice reinforcement or attach reinforcement to dowels by placing in contact and securing with wire ties.
18. Stagger splices in adjacent horizontal reinforcing bars. Lap reinforcing bars at splices a minimum of 40 bar diameters.
19. Grout cells of concrete masonry units, containing reinforcing bars, solid as specified.
20. Install cavity and joint reinforcement as masonry work progresses.

3.6 PLACING REINFORCEMENT

A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or approved submittal drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Position reinforcement accurately at spacing indicated on drawings. Support and secure vertical bars against displacement. Install horizontal reinforcement as masonry work progresses. Where vertical bars are shown in close proximity, provide clear distance between bars of minimum one bar diameter or 25 mm (1 inch), whichever is greater.

C. For columns, piers and pilasters, maintain clear distance between vertical bars as indicated on drawings, minimum 1.5 bar diameters or 38 mm (1-1/2 inches), whichever is greater. Provide lateral ties as indicated on drawings.

D. Splice reinforcement bars only where indicated on drawings, unless approved by Contracting Officer's Representative. Provide lapped splices. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

E. Provide minimum lap as indicated on approved submittal drawings, or if not indicated, minimum 48 bar diameters.

F. Weld splices where indicated on drawings according to AWS D1.4/D1.4M.

G. Embed metal ties in mortar joints as work progresses, with minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.

H. Embed prefabricated horizontal joint reinforcement as work progresses, with minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement minimum 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

I. Anchoring: Anchor reinforced masonry work to supporting structure as indicated on drawings.

J. Anchor reinforced masonry walls at intersections with non-reinforced masonry.

3.7 CONSTRUCTION TOLERANCES

A. Lay masonry units plumb, level and true to line within tolerances according to ACI 530.1/ASCE 6/TMS 602 and as follows:

B. Maximum variation from plumb:

1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
2. In 6000 mm (20 feet) - 9 mm (3/8 inch).
3. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).

C. Maximum variation from level:

1. In any bay or up to 6000 mm (20 feet) - 6 mm (1/4 inch).
2. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).

D. Maximum variation from linear building lines:

1. In any bay or up to 6000 mm (20 feet) - 13 mm (1/2 inch).
2. In 12,000 mm (40 feet) or more - 19 mm (3/4 inch).

E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:

1. Minus 6 mm (1/4 inch).
2. Plus 13 mm (1/2 inch).

F. Maximum variation in prepared opening dimensions:

1. Accurate to minus 0 mm (0 inch).
2. Plus 6 mm (1/4 inch).

3.8 CLEANING AND REPAIR

A. General:

1. Clean exposed masonry surfaces on completion.
2. Protect adjoining construction materials and landscaping during cleaning operations.
3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.

4. Remove mortar droppings and other foreign substances from wall surfaces.

B. Brickwork:

1. First wet surfaces with clean water, then wash down with detergent solution. Do not use muriatic acid.
2. Brush with stiff fiber brushes while washing, and immediately wash with clean water.
3. Remove traces of detergent, foreign streaks, or stains of any nature.

C. Concrete Masonry Units:

1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
2. Allow mud to dry before brushing.

D. Glazed Structural Facing Tile or Brick Units:

1. Clean as recommended manufacturer. Protect light colored mortar joints from discoloration during cleaning.
2. Use on solid masonry walls.
3. Prepare schedule of test locations.

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SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel shapes, plates, and bars.
2. Structural pipe.
3. Bolts, nuts, and washers.

1.2 RELATED REQUIREMENTS

A. Materials Testing and Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. American Institute of Steel Construction (AISC):

1. AISC Manual - Steel Construction Manual, 14th Ed.
2. 303-10 - Code of Structural Steel Buildings and Bridges.
3. 360-10: Specification for Structural Steel Buildings.

C. The American Society of Mechanical Engineers (ASME):

1. B18.22.1-09 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers.

D. American Welding Society (AWS):

1. D1.1/D1.1M-15 - Structural Welding Code - Steel.

E. ASTM International (ASTM):

1. A6/A6M-14 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
2. A36/A36M-14 - Carbon Structural Steel.
3. A53/A53M-12 - Pipe, Steel, Black and Hot-Dip, Zinc-Coated, Welded and Seamless.
4. A123/A123M-15 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. A242/A242M-13 - High-Strength Low-Alloy Structural Steel.
6. A283/A283M-13 - Low and Intermediate Tensile Strength Carbon Steel Plates.
7. A307-14 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
8. A500/A500M-13 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.

9. A501/A501M-14 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
10. A572/A572M-15 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. A992/A992M-15 - Structural Shapes.
12. F2329/F2329M-15 - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy steel Bolts, Screws, washers, Nuts, and Special Threaded Fasteners.
13. F3125/F3125M-15 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

F. Master Painters Institute (MPI):
1. No. 18 - Primer, Zinc Rich, Organic.

G. Military Specifications (Mil. Spec.):
1. MIL-P-21035 - Paint, High Zinc Dust Content, Galvanizing, Repair.

H. Occupational Safety and Health Administration (OSHA):
1. 29 CFR 1926.752(e) - Guidelines for Establishing the Components of a Site-Specific Erection Plan.
2. 29 CFR 1926-2001 - Safety Standards for Steel Erection.

I. Research Council on Structural Connections (RCSC) of The Engineering Foundation:
1. Specification for Structural Joints Using ASTM F3125 Bolts.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.

C. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

D. Test Reports: Certify products comply with specifications.
1. Welders' qualifying tests.

E. Certificates: Certify each product complies with specifications.
1. Structural steel.
2. Steel connections.
3. Welding materials.
4. Shop coat primer paint.

F. Qualifications: Substantiate qualifications comply with specifications.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: AISC Quality Certification participant designated as AISC Certified Plant, Category STD.
   1. Regularly fabricates specified products.
   2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.

B. Installer Qualifications: AISC Quality Certification Program participant designated as AISC-Certified Erector, Category ACSE.
   1. Regularly installs specified products.
   2. Installed specified products with satisfactory service on five similar installations for minimum five years.

C. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design structural steel framing connections complying with specified performance:
   1. Configuration: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with details shown on drawings, supplementing where necessary. The details shown on drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection and the members. Promptly notify the Contracting Officer Representative of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the Contracting Officer's Representative. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

2.2 MATERIALS

A. W-Shapes:

1. ASTM A992/A992M.

B. Channel and Angles:

1. ASTM A36/A36M.

C. Plates and Bars:

1. ASTM A36/A36M.

D. Hollow Structural Sections:

1. ASTM A500/A500M.

E. Structural Pipe: ASTM A53/A53M, Grade B.

F. Bolts, Nuts and Washers: Galvanized for galvanized framing and plain finish for other framing.

1. High-strength bolts, including nuts and washers: ASTM F3125.
2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ASME B18.22.1.

G. Welding Materials: AWS D1.1, type to suit application.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 FABRICATION

A. Fabricate structural steel according to Chapter M, AISC 360.

B. Shop and Field Connections:

1. Weld connections according to AWS D1.1/D1.1M. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
2. High-Strength Bolts: High-strength bolts tightened to a bolt tension minimum 70 percent of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

2.5 FINISHES

A. Shop Priming:

1. Prime paint structural steel according to AISC 303, Section 6.
   a. Interstitial Space Structural Steel: Prime paint, unless indicated to receive sprayed on fireproofing.

B. Shop Finish Painting: Apply primer and finish paint as specified in Section 09 91 00, PAINTING.

C. Do not paint:
   1. Surfaces within 50 mm (2 inches) of field welded joints.
   2. Surfaces indicated to be encased in concrete.
   3. Surfaces receiving sprayed on fireproofing.
   4. Beam top flanges receiving shear connector studs applied.
D. Structural Steel Galvanizing: ASTM A123/A123M, hot dipped, after fabrication. Touch-up after erection: Clean and wire brush any abraded and other spots worn through zinc coating, including threaded portions of bolts and welds and touch-up with galvanizing repair paint.
   1. Galvanize structural steel framing installed at exterior locations.
E. Bolts, Nuts, and Washers Galvanizing: ASTM F2329, hot-dipped.

2.6 ACCESSORIES

A. General: Shop paint steel according to AISC 303, Section 6.
B. Finish Paint System: Primer and finish as specified in Section 09 91 00, PAINTING.
C. Galvanizing Repair Paint: MPI No. 18.

PART 3 - EXECUTION

3.1 ERECTION

A. Erect structural steel according to AISC 303 and AISC 360.
B. Set structural steel accurately at locations and elevations indicated on drawings.
C. Maintain erection tolerances of structural steel within AISC 303 requirements.
   1. Pour Stop Elevation Tolerance: 6 mm (1/4 inch), maximum, before concrete placement.
D. Weld and bolt connections as specified for shop connections.

3.2 FIELD PAINTING

A. After welding, clean and prime weld areas to match adjacent finish.
B. Touch-up primer damaged by construction operations.
C. Apply galvanizing repair paint to galvanized coatings damaged by construction operations.
D. Finish Painting: As specified in Section 09 91 00, PAINTING.

3.3 FIELD QUALITY CONTROL

A. Record Survey:
   1. Engage registered land surveyor or registered civil engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS to perform survey.

2. Measure and record structural steel framing plumbness, level, and alignment after completing bolting and welding and before installation of work supported by structural steel.
3. Identify deviations from allowable tolerances specified in AISC Manual.

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SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:
   1. Exterior non-load-bearing steel stud curtain wall.

1.2 RELATED WORK:

A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.

C. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

D. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.

B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the minimum physical and structural properties indicated.

1.4 SUBMITTALS:

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

B. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.

1.5 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Iron and Steel Institute (AISI):
   Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

C. American Society of Testing and Materials (ASTM):
   A36/A36M-08 .....Standard Specifications for Carbon Structural Steel

A123/A123M-09 .....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09 .....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-10 .....Standard Specifications for Carbon Steel Bolts and Studs

A653/A653M-10 .....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C955 .....Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

C1107/C1107M-08 .....Standard Specifications for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

E488-96(R2003) .....Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

E1190-95(R2007) .....Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members

D. American Welding Society (AWS):

D1.3/D1.3M-08 .....Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035B .....Paint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel for joists, studs and accessories 16 gage and heavier: ASTM A653, structural steel, zinc coated G90, with a yield of 340 MPa (50 ksi) minimum.

B. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated G90, with a yield of 230 MPa (33 ksi) minimum.

C. Galvanizing Repair Paint: MIL-P-21035B.

D. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents,

complying with ASTM C1107, with fluid consistency and a 30 minute working time.

2.2 WALL FRAMING:

A. Steel Studs: Complying with ASTM C 955. Manufacturer's standard C-shaped steel studs of web depth indicated, with lipped flanges, and complying with the following:
   1. Minimum Base-Steel Thickness(uncoated):
      0.0451 inch (43 Mil)
   2. Flange Width:
      1-5/8 inches
   3. Web: Punched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:
   1. Design Uncoated-Steel Thickness: Matching steel studs.
   2. Flange Width: Manufacturer's standard deep flange where indicated, standard flange elsewhere.

2.4 FRAMING ACCESSORIES:

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Deflection track and vertical slide clips.

2.5 ANCHORS, CLIPS, AND FASTENERS:

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times

the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 REQUIREMENTS:

A. Welding in accordance with AWS D1.3

B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

A. Framing components may be preassembled into panels. Panels shall be square with components attached.

B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

C. Hold members in place until fastened.

D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

A. Handle and lift prefabricated panels in a manner as to not distort any member.

B. Securely anchor tracks to supports as shown.

C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.

D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.

G. Install headers in all openings that are larger than the stud spacing in that wall.
H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.
I. Studs in one piece for their entire length, splices will not be permitted.
J. Provide a load distribution member at top track where joist is not located directly over bearing stud.
K. Provide joist bridging and web stiffeners at reaction points where shown.
L. Provide end blocking where joist ends are not restrained from rotation.
M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one-half joist span and when floor and roof openings interrupt one or more spanning members.
N. Provide temporary bracing and leave in place until framing is permanently stabilized.
O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.
P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

3.3 TOLERANCES:

A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.
B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.
C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies wood blocking, furring, nailers, and rough hardware, other than work specified in Section 09 22 16.

1.2 RELATED WORK:

A. All wall framing, furring and backing for wall-mounted items, unless otherwise noted, Section 09 22 16 NON-STRUCTURAL METAL FRAMING.

1.3 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.

1.4 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.

1.5 APPLICABLE PUBLICATIONS:

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

B. American Forest and Paper Association (AFPA):

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

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

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

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

F. American Wood Protection Association (AWPA):

AWPA Book of Standards

G. Commercial Item Description (CID):

A-A-55615 .....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

H. Forest Stewardship Council (FSC):

FSC-STD-01-001(Ver. 4-0)FSC Principles and Criteria for Forest Stewardship

I. Military Specification (Mil. Spec.):

MIL-L-19140E .....Lumber and Plywood, Fire-Retardant Treated

J. Environmental Protection Agency (EPA):

40 CFR 59(2014) .....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

K. U.S. Department of Commerce Product Standard (PS)

PS 1-95 .....Construction and Industrial Plywood

PS 20-10 .....American Softwood Lumber Standard

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. 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.

C. 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.

D. 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.

E. 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.

F. Preservative Treatment:

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

2.2 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 woodwork 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.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:

1. AFPA WCD1 for nailing and framing unless specified otherwise.

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 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.

c. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.

2. Bolts:

a. Fit bolt heads and nuts bearing on wood with washers.

b. Countersink bolt heads flush with the surface of nailers.

c. Embed in concrete and solid masonry or 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.

C. 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.
5. Unless otherwise shown, provide steel wall furring using wood shims where necessary so face of furring forms a true, even plane. Space furring not over 406 mm (16 inches) on centers, butt joints over bearings and rigidly secure in place. Anchor furring on 406 mm (16 inches) centers.

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SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior millwork.

B. Items specified:
   1. Wall Caps
   2. Countertops (not attached to nor included with manufactured casework specified in Section 12 35 70).
   3. Shelves and Rods.
   4. Plastic Resin Decorative Panels.

1.2 RELATED REQUIREMENTS

A. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Stock Casework: Section 12 35 70 HEALTHCARE CASEWORK

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International:
   1. A36/A36M-14 - Carbon Structural Steel.
   2. A53/A53M-12 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
   3. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   4. B26/B26M-14e1 - Aluminum-Alloy Sand Castings.
   5. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   6. ASTM D 635 – Standard Test Method for Rate of Burning.
   7. ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
   8. ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
   9. ASTM D 3763 - Standard Test Method for High Speed Puncture Properties of Plastics Using Load and Displacement Sensors.
   10. E84-15b - Surface Burning Characteristics of Building Materials.

C. American National Standard Institute (ANSI):
   1. ANSI Z97.1 - For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

D. American Hardboard Association (AHA):
   1. A135.4-04 - Basic Hardboard.

E. Architectural Woodwork Institute (AWI):
   1. AWI-09 - Architectural Woodwork Quality Standards and Quality Certification Program.
F. Builders Hardware Manufacturers Association (BHMA):
   1. BHMA/ANSI A156.9-10 - Cabinet Hardware.
   2. BHMA/ANSI A156.11-14 - Cabinet Locks.
   3. BHMA/ANSI A156.16-13 - Auxiliary Hardware.
G. Federal Specifications (Fed. Spec.):
   1. A-A-1922A - Shield Expansion (Calking Anchors, Single Lead).
   2. A-A-1936A - Adhesive, Contact, Neoprene Rubber.
   3. FF-N-836E- Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding.
   4. FF-S-111D(1) - Screw, Wood (Notice 1 inactive for new design).
   5. MM-L-736C(1) - Lumber, Hardwood.
H. National Particleboard Association (NPA):
   1. A208.1-09 - Wood Particleboard.
I. National Electrical Manufacturers Association (NEMA):
   1. LD 3-05 - High-Pressure Decorative Laminates.
J. National Fire Protection Association (NFPA):
   1. NFPA 269 - Standard Test Method for Developing Toxic Potency.
   2. NFPA 286 - Standard methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
K. U.S. Department of Commerce, Product Standard (PS):
   1. PS1-07 - Construction and Industrial Plywood.
   2. PS20-10 - American Softwood Lumber Standard.

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.
   2. Millwork items - Half full-size scale for sections and details 1: 50 (1/4 inch) for elevations and plans.
C. Manufacturer's Literature and Data:
   1. Description of each product.
      a. Hardware.
D. Samples:

1. Plastic Laminate Finished Particleboard: 150 mm by 300 mm (6 by 12 inches), each type and color.
2. Solid Surface: 100 mm by 100 mm (4 inches by 4 inches).
3. Plastic Resin Decorative Panel: 100 mm by 100 mm (4 inches by 4 inches).
4. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications:
   1. Regularly fabricates specified products.
   2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.

B. Installer Qualifications:
   1. Regularly installs specified products.
   2. Installed specified products with satisfactory service on five similar installations for minimum five years.

1.6 DELIVERY, STORAGE AND HANDLING

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.

D. Store products indoors in dry, weathertight, conditioned facility.

E. Protect products from damage during handling and construction operations.

1.7 FIELD CONDITIONS

A. Environment:
   1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
   2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
   3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
   4. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work is not complete and dry.

B. Field Measurements: Verify field conditions affecting 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. Grading and Marking: Factory mark with grade stamp lumber and plywood of inspection agency approved by the Board of Review, American Lumber Standard Committee.

B. Lumber:
   1. Sizes:
      a. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes within manufacturing tolerances allowed by the standard under which product is produced.
   2. Hardwood: MM-L-736, species as specified for each item.
   3. Softwood: PS-20.

C. Plywood:
   1. Softwood Plywood: DOC PS1.
      a. Plywood, 13 mm (1/2 inch) and thicker; minimum five ply construction, except 32 mm (1-1/4 inch) thick plywood minimum seven ply.
      b. Acrylic Solid Surface Plywood Cores:
         1) Exterior Type, and species group.
         2) Veneer Grade: A-C.

D. Particleboard: NPA A208.1.
   1. Plastic Laminate Particleboard Cores:
      a. Type 1, Grade 1-M-3 unless otherwise specified.
      b. Type 2, Grade 2-M-2, exterior bond, for tops with sinks.

E. Plastic Laminate: NEMA LD-3.
   1. Shelving: NEMA, CLS as a minimum, with the following:
      a. Plastic laminate clad particle board.

F. Acrylic Solid Surface: NEMA-LD-3.

G. Stainless Steel: ASTM A240, Type 302 or 304.

H. Cast Aluminum: ASTM B26.

I. Extruded Aluminum: ASTM B221.

J. Steel: ANSI 156.16.

K. Chrome-Plated Steel: ANSI 156.16.

L. Plastic Resin Decorative Panel: ANSI Z97.1.

2.2 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide each product from one manufacturer and from one production run.

2.3 FABRICATION

A. General:

1. AWI Custom Grade for interior millwork.
2. Plywood, minimum 13 mm (1/2 inch), unless otherwise shown on Drawings or specified.

B. Plastic Laminate Work (at locations not attached to nor included with manufactured casework specified in Section 12 35 70):

1. Factory glued to 3/4-inch particle board core.
2. Cover exposed edges with matching plastic molded edge strips.

C. Shelves and Rods:

1. Plastic laminate cover, 19 mm (3/4 inch) thick particle board core with plastic molded edge and end strips. Size, as shown on Drawings.
2. Rod or Closet Bar: L03131.
3. Combination Garment and Shelf Support, Intermediate Support for Closet Bar: B04051 for rods over 1800 mm (6 feet) long.

D. Acrylic Solid Surface Wall Caps and Countertops (at locations not attached to nor included with manufactured casework specified in Section 12 35 70):

1. Thickness: 13 mm (1/2 inch) solid surface applied with waterproof adhesive to 19 mm (3/4 inch) exterior-grade plywood.
2. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid surface manufacturer requirements. Form joints between components to create inconspicuous seams, using manufacturer's standard joint adhesive. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
3. Thermoform corners and edges to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.
4. Ensure no blistering, whitening and cracking of components during forming.

5. Form backsplashes from solid surfacing material with radius cove where counter and backsplashes meet as indicated on Drawings. Refer to Technical Bulletin K28235 Thermoformed Backsplash.
6. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid surface material under each joint.
7. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.
8. Finish: Ensure surfaces have uniform finish.
9. Fabrication Tolerances:
   a. Variation in Component Size: +/-3 mm (+/-1/8").
   b. Location of Openings: +/-3 mm (+/-1/8") from indicated location.

E. Plastic Resin Decorative Panel:
1. Engineered co-polyester resin.
2. Sheet Size: Maximum 4-foot by 10-foot.
3. Thickness: 1/2 inch (12.7 mm).
4. Interlayer Materials: Compatible with polyesters and bonding process to create a monolithic sheet of material when complete.
5. Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.
6. Comply with manufacturer’s written recommendations for fabrication.
7. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
   a. Sawing: Select equipment and blades suitable for type of cut required.
   b. Drilling: Drills specifically designed for use with plastic products.
   c. Milling: Climb cut where possible.
   d. Routing
   e. Tapping
8. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.
9. Cleaner: Type recommended by manufacturer.
10. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide

threaded metal inserts for applications requiring frequent disassembly such as light fixtures.

11. Bonding Cements: May be achieved with solvents or adhesives, suitable for use with product and application.

2.4 ACCESSORIES

A. Hardware:

1. Rough Hardware:
   a. Provide rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electric-galvanizing process.
   b. Fasteners:
      1) Bolts with Nuts: FF-N-836.
      2) Expansion Bolts: A-A-1922A.
      3) Screws: Fed. Spec. FF-S-111.
2. Finish Hardware:
   a. Auxiliary Hardware: ANSI A156.16.
      1) Combination Garment rod and Shelf Support: B04051 japanned or enamel finish.
      2) Closet Bar: L03131 chrome finish of required length.
   b. Counter Brackets:
      1) Steel angles drilled for fasteners on 100 mm (4 inches) centers.
      2) Baked gray enamel finish.
   c. Edge Strips Moldings:
      1) Driven type "T" shape with serrated retaining stem; vinyl plastic to match plastic laminate color.
   d. Primers: Manufacturer's standard primer for steel providing baked enamel finish.

B. Adhesive:

1. Plastic Laminate: Fed. Spec. A-A-1936.
2. Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Remove existing construction as shown on drawings to permit new installation.

1. Dispose of removed materials.

D. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION

A. Installation:

1. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
2. Plumb and level items unless shown otherwise.
3. Apply adhesive uniformly for full contact between finish and substrate.

B. Acrylic Solid Surface Wall Caps and Countertops:

1. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.
2. Form field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.
3. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer’s written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.
4. Install countertops with no more than 3 mm (1/8") sag over a 3 m (10') span, bow or other variation from a straight line.
5. Adhere undermount/submount/bevel mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.
6. Adhere topmount sinks/bowls to countertops using manufacturer recommended adhesives and color-matched silicone sealant.
7. Seal between wall and components with joint sealant as specified herein and in Section 07 92 00, as applicable.
8. Provide backsplashes and endsplashes as indicated on Drawings. Adhere to countertops using a standard color-matched silicone sealant. Adhere applied sidesplashes to countertops using a standard color-matched silicone sealant. Provide coved backsplashes and sidesplashes at walls and adjacent millwork. Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on

reviewed Shop Drawings. Adhere to countertops using manufacturer's standard color-matched joint adhesive.

C. Plastic Resin Decorative Panels:
   1. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.
   2. Manufacturer's shop to fabricate items to the greatest degree possible.
   3. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
   4. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
   5. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

D. Shelves:
   1. Install metal bracket, ANSI A156.16, B04051, not over 1200 mm (4 feet) on centers where shelf length exceeds 1800 mm (6 feet) in length with metal rods, clothes hanger bars ANSI A156.16, L03131, of required length, full length of shelf.

3.3 CLEANING

A. Remove excess adhesive before adhesive sets.
B. Clean exposed surfaces. Remove contaminants and stains.
C. Touch up damaged factory finishes.
   1. Repair painted surfaces with touch up primer.

3.4 PROTECTION

A. Protect finish carpentry from traffic and construction operations.
B. Cover finish carpentry with reinforced kraft paper, and plywood or hardboard.
C. Remove protective materials immediately before acceptance.
D. Repair damage.

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SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermal insulation.
    a. Batt or blanket insulation at exterior framed and furred walls.
2. Acoustical insulation.
    a. Batt and blanket insulation at interior framed partitions.

1.2 RELATED REQUIREMENTS

A. 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. C552-15 - Cellular Glass Thermal Insulation.
2. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
3. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
4. 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.
5. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
6. D312/D312M-15 - Asphalt Used in Roofing.
7. E84-15a - Surface Burning Characteristics of Building Materials.
8. 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.

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.

2.2 THERMAL INSULATION

A. 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.

B. Inside Face of Exterior Wall Insulation:

1. Mineral Fiber Board: ASTM C612, Type IB or II.

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 unfaced.
   a. Density: nominal 4.5 pound.
3. Mineral Fiber Batt or Blankets: ASTM C665 unfaced.
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 inch) 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 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. Ceilings and Soffits:

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.

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. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedments.
   a. 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.

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 24 00
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior insulation and finish systems (EIFS) for patch-to-match of existing at new duct penetration, as well as infill at removed louver.

1.2 RELATED REQUIREMENTS

A. Gypsum Board Sheathing 09 29 00, GYPSUM SHEATHING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. B117-11 - Operating Salt Spray (Fog) Apparatus.
2. C177-13 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
3. C297/C297M-15 - Flatwise Tensile Strength of Sandwich Constructions.
4. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
5. C666/C666M-15 - Resistance of Concrete to Rapid Freezing and Thawing.
6. C920-14a - Elastomeric Joint Sealants.
7. D968-15 - Abrasion Resistance of Organic Coatings by Falling Abrasive.
8. D2794-93(2010) - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
9. E84-15a - Surface Burning Characteristics of Building Materials.
10. E96/E96M-15 - Water Vapor Transmission of Materials.
11. E119-15 - Fire Tests of Building Construction and Materials.
12. E2486/E2486M-13 - Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS).
13. G90-10 - Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight.

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.
2. Show details for lintels, openings, penetrations, flashing, and other special applications.

C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.
   3. Warranty.
D. Samples:
   1. Two 300 mm (1 foot) square samples of EIFS finishes over cement board identical to proposed installation in thickness, color, texture insulation and workmanship.
E. Test reports: Certify each product and complete system complies with specifications.
F. Qualifications: Substantiate qualifications comply with specifications.
   1. Installer with project experience list.

1.5 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.
      a. Project Experience List: Provide contact names and addresses for completed projects.

1.6 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.

1.7 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight conditioned facility.
B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Environment:
   1. Unless greater temperature is required by system manufacturer, install products only when ambient air temperature is minimum 7 degrees C (45 degrees F) and rising and predicted to persist for 24 hours after installation.

1.9 WARRANTY

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

B. Manufacturer's Warranty: Warrant EIFS system materials against material and manufacturing defects.
   1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

A. Basis of Design: Patch to match existing.

B. Provide system components from one manufacturer and from one production run.

2.2 EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

A. Description: Polymer-Based (PB) system consists of Type I molded rigid polystyrene insulation adhered to substrate and finished with glass-fiber-mesh reinforced based-coat and textured finish coat.

B. Performance Requirements:
   1. Surface Burning Characteristics: When tested according to ASTM E84.
      a. Flame Spread Rating: 25 maximum.
      b. Smoke Developed Rating: 450 maximum.
   2. Full Scale Wall Fire Test: No significant surface flaming or propagation of vertical or lateral flames when tested according to ASTM E119.
   3. Impact Resistance (Sample to be cured. Finish, base coat and fabric over 25 mm (1 inch) insulation typical of project application), ASTM E2486/E2486M:
      a. Medium Impact Resistance - 5.65 to 10.1 J (50-89 inch-lbs.).
   4. Structural Performance: (Test panels 1200 mm x 1200 mm (4 feet by 4 feet) typical of project application): ASTM E330/E330M, no permanent deformation, delamination or deterioration for positive and negative pressures as required.
   5. Water Penetration: No water penetration.
   6. Abrasion Resistance: ASTM D968, 500 liters of sand with slight smoothing and no loss of film integrity.
   7. Accelerated Weathering: ASTM G90; 2000 hours with no deterioration.
   8. Salt Spray Resistance: ASTM B117; Withstand 300 hours with no deleterious effects.
   9. Water Vapor: ASTM E96/E96M; Maximum 12 g/h/sq. m (18 grains/hour/sf.).
   10. Absorption-Freeze-Thaw (Pre-weighed 100 mm x 200 mm (4 inch by 8 inch) specimens; 25 mm (1 inch) insulation, faced with finish coat cured and stored in air; tested with edges and back open), ASTM C67.

a. 50 Cycles: 20 hours at 9 degrees C (4 degrees F); 4-hour thaw in water.
b. After 50 cycles; total weight gain of maximum 6.2 grams. No checking splitting, or cracking.

C. Adhesive: Manufacturers standard product including primer compatible with substrate.

D. Insulation:
1. Thermal Resistance: Thermal resistance (R-value), as indicated, measured by ASTM C177.
2. Insulating Material: ASTM C578, as recommended by EIFS manufacturer and treated to be compatible with EIFS components. Age insulation minimum of 6 weeks before installation.
3. Provide Type I Molded Expanded Polystyrene (MEPS) insulation board for Type PB systems, in sizes as required except maximum 600 mm X 1200 mm (24 X 48 inches) boards, and maximum 100 mm (4 inches) thick.

E. Mechanical Anchors: As recommended by EIFS manufacturer.

F. Accessories:
1. Trim, control joints, weep screed, edging, anchors, expansion joints, and other items required for proper installation as recommended by EIFS manufacturer.
2. Metal Items and Fasteners: Corrosion resistant.

G. Reinforcing Fabric: Balanced, open weave, glass fiber fabric made from twisted multi-end strands specifically treated for compatibility with the other materials of system.
1. Minimum weight 100 g/sq. m (4.3 oz./sq. yd.).

H. Base Coat: Manufacturer's standard.

I. Finish Coat: Manufacturer's standard. Minimum thickness 1.5 mm (1/16 inch), complying with performance requirements; color and texture to match existing.

J. Sealant: ASTM C920; Class 50 with 100 percent recovery. Type, grade and use as recommended by sealant manufacturer.
1. When required, provide non-staining primer, bond breaker, and backer rods as recommended by sealant manufacturer.
2. Do not use absorptive materials as backer rods.

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. Notify Contracting Officer's Representative in writing of conditions detrimental to proper completion of work.

D. Do not proceed with work until unsatisfactory conditions are corrected.

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.

3.3 CONTROL JOINT INSTALLATION

A. See drawings for location of building control joints and surface control joints.

B. Install surface control joints as follows:

1. Exterior Insulation and Finish System. Install at 15 meters (50 feet) maximum in both directions and at building expansion joints, floor lines and where EIFS intersects other materials per manufacturer's recommendations.

3.4 SEALANT INSTALLATION

A. Exterior Insulation and Finish System: Apply sealant according to EIFS manufacturer's recommendation.

B. Do not apply sealant in locations intended for water drainage.

3.5 EXTERIOR INSULATION AND FINISH SYSTEM INSTALLATION

A. Insulation Board Layout: Place horizontally from level base line. Stagger vertical joints and interlock at corners. Butt joints tightly. Provide flush surfaces at joints. Do not align joints with corners of doors, windows and other openings. Do not leave insulation board exposed longer than recommended by insulation manufacturer.

B. Adhesive: Apply directly to entire back surface of the insulation board as recommended by the system manufacturer and immediately apply to substrate. Apply firm pressure over entire board to ensure uniform contact and level surface. Allow adhesive to cure for 24 hours minimum before sanding.

C. Create means of drainage between insulation board and substrate.

D. Flash penetrations and terminations to discharge water to exterior.

E. Mechanical Fasteners: Fasten with manufacturer's standard anchors, spaced as recommended by manufacturer, maximum 600 mm (24 inches) on center horizontally and vertically.

F. Sanding: Sand entire surface of insulation before applying base coat, level high joints and remove dirt and weathering damage. Do not pre-fill low areas with basecoat.

G. Base Coat: Trowel apply uniform thickness of base coat to insulation with minimum thickness of 1-1/2 times reinforcing fabric thickness and minimum 2.4 mm (3/32 inches) wet thickness.

H. Install reinforcing fabric embedded in base coat. Provide diagonal reinforcement at opening corners, back wrapping, and other reinforcement recommended by EIFS manufacturer. Ensure fabric pattern is not visible beneath the surface of the basecoat after installation. Cure basecoat 24 hours minimum before applying finish coat.

I. Finish Coat:

1. Inspect basecoat for damage or defects and repair before applying finish coat.
2. Trowel apply finish coat minimum 1.6 mm (1/16 inch) thick.
3. Texture finish as required.
4. Surface Tolerance: Maximum 1/500 (1/4 inch in 10 feet) deviation from plumb and plane.

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FCFZSECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies patch-to-match of spray-applied mineral fiber and cementitious coverings to provide fire resistance to interior structural steel members where covering is deficient, or is removed or damaged during demolition or construction.

1.2 SUBMITTALS:

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

B. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

C. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

D. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and 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 as specified under paragraph Examination.

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.

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

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	ASTM E84	Flame spread 25 or less smoke

	Characteristic	Test	Results
	Characteristics with adhesive and sealer to be used		developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE:

A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER:

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

2.4 WATER:

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL:

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg per square meter (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify temperature and enclosure conditions required by fire-proofing material manufacturer.

E. 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 openings subject to damage from fallout or overspray of fireproofing materials during application.

D. Application of Metal Lath:

1. Apply to beam and columns which fail ASTM E736 Bond Test requirements.
2. Tack weld or mechanically fasten on maximum of 305 mm (12-inch) center.
3. 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. Application is to be completed in one area, inspected and approved by COR before removal of application equipment and proceeding with further work.

3.3 PATCHING AND REPAIRING:

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.

1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
3. Hand-mixing of material is not permitted.

C. Repair:

1. Respray all rejected areas.
2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.4 SCHEDULE:

A. Patch to match fireproofing material that is deficient, or damaged or removed on structural steel members during demolition or construction.

B. Type II (222):

1. Two hour fire rating: Columns supporting one or more floors.
2. One hour fire rating: Columns supporting roof only.
3. Two hour fire rating: Beams supporting one or more floors.
4. One hour fire rating: Beams supporting roof only.

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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 and floors 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. Expansion joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

B. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

C. Sealants and application: Section 07 92 00, JOINT SEALANTS.

D. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS:

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

B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

C. List of FM, UL, or WH classification number of systems installed.

D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

E. 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.

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.

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 FIRE STOPPING IN PARTITIONS:

A. Provide firestopping in 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 in accordance with FM, UL, WH, or other approved system details and installation instructions.

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).

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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. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

B. Glazing: Section 08 80 00, GLAZING.

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.

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.

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. Installer qualifications.

C. Contractor certification.

D. Manufacturer's installation instructions for each product used.

E. Cured samples of exposed sealants for each color.

F. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

G. 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
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. Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
2. Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
b. Metal to metal.
c. Masonry to masonry or stone.
d. Masonry expansion and control joints.
e. Masonry joints where shelf angles occur.
f. Voids where items penetrate exterior walls.

g. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

B. Floor Joint Sealant:
1. ASTM C920, Type S or M, Grade P, Class 25, Use T.
2. Provide location(s) of floor joint sealant as follows.
a. Seats of metal thresholds exterior doors.
b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

C. Interior Sealants:
1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
a. Architectural Sealants: 250 g/L.
b. Sealant Primers for Nonporous Substrates: 250 g/L.
c. Sealant Primers for Porous Substrates: 775 g/L.
2. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
3. Food Service: Use a Vinyl Acetate Homopolymer, or other low VOC, non-toxic sealant approved for use in food preparation areas.
4. Provide location(s) of interior sealant as follows:
a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
b. Perimeter of doors, windows, access panel frames which adjoin GWB, concrete, or masonry surfaces.
c. Interior surfaces of exterior wall penetrations.
d. Joints at masonry walls and columns, piers, concrete walls or exterior walls.
e. Exposed isolation joints at top of full height walls.
f. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.

D. Acoustical Sealant:
1. Conforming to ASTM C919; flame spread of 25 or less; and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Acoustical sealants have a consistency of 250 to 310 when tested in accordance with ASTM D217; remain flexible and adhesive

after 500 hours of accelerated weathering as specified in ASTM C734; and be non-staining.

2. Provide location(s) of acoustical sealant as follows:
   a. Exposed acoustical joint at sound rated partitions.
   b. Concealed acoustic joints at sound rated partitions.
   c. Joints where item pass-through sound rated partitions.

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 FILLER:

A. Mineral fiberboard: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.5 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.6 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.

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 assemblies.
      a. Metal plate covers at floor joints.
      b. Extruded flexible gasket cover assemblies at floor and wall joints.
      c. Ceiling assemblies at acoustical tile ceilings.

1.2 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. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
   4. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
   5. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   6. B221M 13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
   7. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
   8. E1399/E1399M-97(2013)e1 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

D. National Association of Architectural Metal Manufacturers (NAAMM):
   1. AMP 500-06 - Metal Finishes Manual.

1.3 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.
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 for selection.
2. Each type and color of flexible seal for selection.

E. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.4 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.

1.5 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

1.6 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.

1.7 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. Provide expansion joint cover assemblies complying with specified performance criteria as described in ASTM E1299. Existing conditions to be verified in field.

B. Floor Joints: Live loads, including rolling loads.

1. Load Resistance: ASCE/SEI 7.
2. Maximum Deflection: 1/360 of span, maximum.

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. Elastomeric Sealant: As specified in Section 07 92 00, JOINT SEALANTS.

G. Elastomeric Seals:

1. Flexible extruded polyvinyl chloride, meeting a Shore A hardness of 75 with UV stabilizer. Manufacturer's standard colors.

H. Thermoplastic Rubber:

1. ASTM C864.
2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.

2.4 PRODUCTS - GENERAL

A. Provide each product from one manufacturer.

1. Provide 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.

2.5 FABRICATION

A. Floor-to-Floor Metal Plate Joints:
   1. Frames: Metal, continuous on both sides of joint designed to support center 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. Center Plate: Metal, matching frames where exposed.
      a. Supported Load: 19.2 MPa (400 psf), minimum.
      b. Rattle-free due to traffic.

B. Extruded Flexible Gasket at GWB Wall Joint Assemblies:
   1. Frames: Aluminum, both sides of joint.
   2. Seal: Flexible extruded gasket 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 primary seal designed to remain in aluminum frame, throughout movement of joint.
      b. Flush mounted seal designed for plus or minus 50 percent, movement of joint width.
   3. Finishes: To be selected from Manufacturer’s standard finishes.

C. Extruded Flexible Gasket Floor Joint Assemblies:
   1. Dual Elastomeric Seal:
      a. Exposed Metal: Aluminum, mill finish.
      b. Seal Material: Thermoplastic rubber, dual durometer with flat profile free of ridges/reveals that collect dirt.
      c. Cover Plate:
         1) Recessed to accept field-applied flexible finish materials.
         2) Recess Depth: 3/8 inch.
         3) Cover plate held in place with turnbar. Spring clips do not consistently comply with ASTM-E1399 testing and are not acceptable.
         4) Attachment Method: Mechanical anchors.
         5) Load Capacity: Standard duty.
   2. Finishes: To be selected from Manufacturer’s standard finishes.

D. Ceiling Assemblies at Acoustical Tile Ceilings:
   1. Frames: Metal, continuous on both sides of joint, flush mounted with no exposed fasteners.

2. Flexible Insert: Variable movement, semi-rigid, dual durometer vinyl locked into frame.
   a. Face Style: Accordion, to span joint width without sagging.
3. Finishes: To be selected from Manufacturer's standard finishes.

2.6 FINISHES

A. 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.

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. Fasteners for Aluminum: Stainless steel.
   2. 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 and ceiling 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 cover plates.
K. Apply sealant where required to prevent water and air infiltration.
L. 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.
M. Apply sealant where required to prevent water and air infiltration.
N. 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.

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.

- - E N D - -

SECTION 04 55 51
3OMMOR YETAM GPAYES

-APT 5 L .ENEPAM

5U5 S2YYAPD

A. Section Includes:

1. Hollow metal door frames for wood doors at interior locations.

5UQ PEMATEB PE62IPEYENTS

A. Door Hardware: Section 08 71 00, DOOR HARDWARE.

B. Card Readers and Biometric Devices: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.

5U1 A--MICAVME -2VMICATIONS

A. Comply with references to extent specified in this section.

B. American National Standard Institute (ANSI):

1. A250.8-2014 - Standard Steel Doors and Frames.

C. ASTM International (ASTM):

1. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
2. E90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

D. Master Painters Institute (MPI):

1. No. 18 - Primer, Zinc Rich, Organic.

E. National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

F. National Fire Protection Association (NFPA):

1. 80-16 - Fire Doors and Other Opening Protectives.

G. UL LLC (UL):

1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
2. 1784-15 - Air Leakage Tests of Door Assemblies and Other Opening Protectives.

5U7 S2VYITTAMS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Include schedule showing each door and frame requirements // fire label and smoke control label for openings.

3. Installation instructions.

5UH BEMI8EPD

A. Fasten temporary steel spreaders across the bottom of each door frame before shipment.

B. Deliver products in manufacturer's original sealed packaging.

C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.

D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

5UW STOPA.E ANB 3ANBMIN.

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

5UX RAPPANTD

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

-APT Q L -POB2CTS

QU5 SDSTEY -EPGOPYANCE

A. Design hollow metal doors and frames complying with specified performance:

1. Fire Frames: UL 10C; NFPA 80 labeled.
   a. Fire Ratings: See drawings.
2. Smoke Control Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cu. m/s/sq. m (3.0 cfm/sf) at 24.9 Pa (0.10 inches water gage) pressure differential.

QUQ YATEPIAMS

A. Sheet Steel: ASTM A1008/A1008M, cold-rolled.

QU1 -POB2CTS L .ENEPAM

A. Provide hollow metal doors and frames from one manufacturer.

QU7 3OMMOR YETAM GPAYES

A. Hollow Metal Frames: ANSI A250.8; Knock-down. See drawings for sizes and designs.

1. Interior Frames:
   a. Wood Doors 1.3 mm (0.053 inch) thick.
   b. Interior Automatic Operator Door Frames: 1.7 mm (0.067 inch) thick.

B. Frame Materials:

1. Interior Frames: Sheet steel.

QUH GAVPICATION

A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.

B. Hollow Metal Frame Fabrication:

1. Fasten mortar guards to back of hardware reinforcements.
2. Terminated Stops: ANSI A250.8.
3. Frame Anchors:
    a. Floor anchors:
        1) Provide extension type floor anchors to compensate for depth of floor fills.
        2) Provide 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive floor fasteners.
        3) Provide mullion 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two floor fasteners and frame anchor screws.
        4) Provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for floor fasteners and frame anchor screws for sill sections.
            a) Space floor bolts50 mm (24 inches) on center.
    b. Jamb anchors:
        1) Place anchors on jambs:
            a) Near top and bottom of each frame.
            b) At intermediate points at maximum 600 mm (24 inches) spacing.
        2) Form jamb anchors from steel minimum 1 mm (0.042 inch) thick.
        3) Anchors for stud partitions: Provide tabs for securing anchor to sides of studs. Provide one of the following:
            a) Welded type.
            b) Lock-in snap-in type.
        4) Modify frame anchors to fit special frame and wall construction.
        5) Provide special anchors where shown on drawings and where required to suit application.

QUW GINIS3ES

A. Steel : ANSI A250.8; shop primed.

B. Finish exposed surfaces after fabrication.

QUX ACCESSOPIES

A. Primers: ANSI A250.8.

B. Barrier Coating: ASTM D1187/D1187M.

C. Welding Materials: AWS D1.1/D1.1M, type to suit application.

D. Clips Connecting Members and Sleeves: Match door faces.

E. Fasteners:

1. Metal Framing: Steel drill screws.

F. Anchors: Steel.

G. Insulation: Unfaced mineral wool.

-APT 1 L EFEC2TION

1U5 -PE-APATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

1UQ INSTAMMATION L .ENEPAM

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

2. Install frames according to NFPA 80.

3. Install smoke control frames according to NFPA 105.

1U1 GPAYE INSTAMMATION

A. Apply barrier coating to concealed surfaces of frames built into masonry.

B. Plumb, align, and brace frames until permanent anchors are set.

1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.

2. Use wood spreaders at bottom of frame when shipping spreader is removed.

3. Where construction permits concealment, leave shipping spreaders in place after installation, otherwise remove spreaders when frames are set and anchored.

4. Remove wood spreaders and braces when walls are built, and jamb anchors are secured.

C. Floor Anchors:

1. Anchor frame jambs to floor with two expansion bolts.

a. Use 6 mm (1/4 inch) diameter bolts.

2. Power actuated drive pins are acceptable to secure frame anchors to concrete floors.

D. Jamb Anchors:

1. Metal Framed Walls: Secure anchors to sides of studs with two fasteners through anchor tabs.

E. Touch up damaged factory finishes.

1. Repair painted surfaces with touch up primer.

1U7 CMEANIN.

A. Clean exposed frame surfaces. Remove contaminants and stains.

1UH -POTECTION

A. Protect frames from traffic and construction operations.

B. Remove protective materials immediately before acceptance.

C. Repair damage.

- - - E N D - - -

SECTION 04 51 00
INTE3IO3 MOOR ROO3S

YA3T 5 G PENE3A-

5L5 S.UUA32

A. Section Includes:
   1. Interior flush wood doors with prefinished, prefit option.
      a. Fire rated doors.
      b. Smoke rated doors.

5LD 3E-ATER 3EQ.I3EUENTS

A. Door Hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.
B. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL FRAMES and Section 08 71 00, DOOR HARDWARE.
C. Door Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

5LB AYY-ICA6-E Y.6-ICATIONS

A. Comply with references to extent specified in this section.
B. American National Standards Institute/Window and Door Manufacturers Association (ANSI/WDMA):
   1. I.S. 1A-13 - Architectural Wood Flush Doors.
   2. I.S. 6A-13 - Interior Architectural Stile and Rails Doors.
C. National Fire Protection Association (NFPA):
   1. 80-16 - Fire Doors and Other Opening Protectives.
   2. 252-12 - Fire Tests of Door Assemblies.
D. UL LLC (UL):
   1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
E. Window and Door Manufacturers Association (WDMA):
   1. TM 7-14 - Cycle-Slam Test.
   2. TM 8-14 - Hinge Loading Test.
   3. TM 10-14 - Screw Holding Capacity.

5L1 S.6UITTA-S

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.
   2. Include details of glazing.
   3. Indicate project specific requirements not included in Manufacturer's Literature and Data submittal.
C. Manufacturer's Literature and Data:
   1. Description of each product.

2. Fire rated doors showing conformance with NFPA 80.

D. Samples:

1. C/S Acrovyn (or equal) laminate finish sample 200 mm by 275 mm (8 inches by 11 inches) showing specified color and finish.

E. Test Reports: Indicate each product complies with specifications.

1. Screw Holding Capacity Test.
2. Cycle-Slam Test.
3. Hinge-Loading Test.

F. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

5LV RE-I7E32

A. Deliver products in manufacturer's original sealed packaging.

1. Minimum 0.15 mm (6 mil) polyethylene bags or cardboard packaging to remain unbroken during delivery and storage.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, and manufacture date.

1. Identify door opening corresponding to Door Schedule.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

5LH STO3APE ANR 8ANR-INP

A. Store products indoors in dry, weathertight facility.

1. Store doors according to ANSI/WDMA I.S. 1A.

B. Protect products from damage during handling and construction operations.

5LW XIE-R CONRITIONS

A. Environment:

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
2. Work Area Ambient Temperature Range: 21 to 27 degrees C (70 to 80 degrees F) continuously, beginning 48 hours before installation.
3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
   a. Comply with door manufacturer's instructions for relative humidity.

5L4 MA33ANT2

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

B. Manufacturer's Warranty: Warrant interior factory finished flush wood doors against material and manufacturing defects.

1. Warranty Period: Lifetime of original installation.

YA3T D G Y3OR.CTS

DL5 Y3OR.CTS G PENE3A-

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide each product from one manufacturer.

DLD X-.S8 MOOR ROO3S

A. General:

1. ANSI/WDMA I.S. 1A, Extra Heavy Duty.
2. Adhesive: Type II.
3. Core: Structural composite lumber, except when mineral core is required for fire rating.
4. Thickness: 44 mm (1-3/4 inches) unless otherwise shown or specified.

B. Faces:

1. ANSI/WDMA I.S. 1A.
2. One finish throughout project unless scheduled or otherwise shown.

C. Stops, Louvers, Muntins and Moldings for Flush Doors:

1. C/S Acrovyn (or equal) wrapped metal lite kit.

D. Replaceable Stiles and Acrovyn (or equal) Edge Guard:

1. Composite material having screw withdrawal force greater than minimum performance level value when tested according to WDMA TM 10.
2. Provide adequate blocking for bottom of doors having mechanically operated door bottom seal meeting or exceeding performance duty level per WDMA TM 10 for horizontal door edge screw holding.

E. Fire-Rated Wood Doors:

1. Fire Resistance Rating:
   a. B Label: 1-1/2 hours.
   b. C Label: 3/4 hour.
2. Labels:
   a. Comply with NFPA 252, UL 10C, and labeled by qualified testing and inspection agency showing fire resistance rating.
   b. Metal labels with raised or incised markings.
3. Performance Criteria for Stiles of Doors Utilizing Standard Mortise Leaf Hinges:
   a. Hinge Loading: WDMA TM 8. Average of 10 test samples for Extra Heavy-Duty doors.

b. Direct Screw Withdrawal: WDMA TM 10 for Extra Heavy-Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.

c. Cycle-Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested according to WDMA TM 7.

4. Hardware Reinforcement:

a. Provide fire rated doors with hardware reinforcement blocking.

b. Size of lock blocks as required to secure hardware specified.

c. Top, Bottom and Intermediate Rail Blocks: Minimum 125 mm (5 inches) by full core width.

d. Reinforcement blocking in compliance with labeling requirements.

e. Mineral material similar to core is not acceptable.

5. Other Core Components: Manufacturer's standard as allowed by labeling requirements.

6. Glazed Vision Panel Frame: Steel approved for use in labeled doors.

7. Astragal: Steel type for pairs of doors.

F. Smoke Barrier Doors:

1. Glazed Vision Panel Frame: Steel approved for use in labeled doors.

2. Astragal: Steel type for pairs of doors, including double egress doors.

a. Bottom Seal: As specified in Section 08 71 00, DOOR HARDWARE.

DLB XA63ICATION

A. Factory machine interior wood doors to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

1. Factory fit fire rated doors according to NFPA 80.

B. Rout doors for hardware using templates and location heights specified in Section 08 71 00, DOOR HARDWARE.

C. Factory fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (2 inches) of door thickness.

D. Clearances between Doors and Frames and Floors:

1. Fire Rated Doors: Comply with NFPA 80.

a. Doors with Automatic Bottom Seal: Maximum clearance 10 mm (3/8 inch) at threshold.

b. Other Door Bottoms: Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.

2. Door Jambs, Heads, and Meeting Stiles: Maximum 3 mm (1/8 inch).

E. Provide cutouts for glazed openings.

F. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

G. Identify each door on top edge.

1. Mark with stamp, brand or other indelible mark, giving manufacturer’s name, door’s trade name, construction of door, date of manufacture and quality.
2. Mark door or provide separate certification including name of inspection organization.
3. Identify door manufacturing standard, including glue type.
4. Identify veneer and quality certification.
5. Identification of preservative treatment for stile and rail doors.

DL1 XINIS8ES

A. Field Finished Doors: Seal top and bottom edges of doors with two coats of catalyzed polyurethane or water-resistant sealer.

B. Factory Finish: Equal to C/S Acrovyn Laminate.

YA3T B G EFEC.TION

BL5 Y3EYA3ATION

A. Examine and verify substrate suitability for product installation.

1. Verify door frames are properly anchored.
2. Verify door frames are plumb, square, in plane, and within tolerances for door installation.

B. Protect existing construction and completed work from damage.

C. Install astragal on active leaf of pair of smoke doors and one leaf of double egress smoke doors.

BLD INSTA--ATION

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. Install fire rated doors according to NFPA 80.
2. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

BLB Y3OTECTION

A. After installation, place shipping container over door and tape in place.

1. Do not apply tape to door faces and edges.

B. Provide protective covering over exposed hardware in addition to covering door.

C. Maintain covering in good condition until removal is directed by Contracting Officer's Representative.

- - E N D - -

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

A. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

B. Field Painting: Section 09 91 00, PAINTING.

C. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Locations of Access Doors for Ductwork Cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS.

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.

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.

2.2 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide each product from one manufacturer.

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 steel sheet, with mineral-fiber insulation core, insulated sandwich type construction.

D. Frame: Minimum 1.5 mm (0.0598 inch) thick steel sheet, depth and configuration to suit material and construction type where installed.
   1. Frame Flange: Provide at units installed in concrete, masonry, or gypsum board.
   2. Exposed Joints in Flange: Weld and grind smooth.
E. Provide automatic closing device.
F. Hinge: Continuous // steel // 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. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
   2. 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 sheet.
   2. Reinforce to maintain flat surface.
B. Frame:
   1. 1.5 mm (0.06 inch) thick steel sheet, depth and configuration to suit material and construction type where installed.
   2. Frame Flange: Provide at units installed in concrete, masonry, and gypsum board.
   3. Exposed Joints in Flange: Weld and grind smooth.
C. Hinge:
   1. Concealed spring hinge, 175 degrees of opening.
   2. Removable hinge pin to allow removal of door panel from frame.
D. Lock:
   1. Flush, screwdriver-operated cam lock.

2.5 FABRICATION - GENERAL

A. Size: Minimum 600 mm (24 inches) square door unless otherwise shown 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.

2.6 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.
   d. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.

B. Stainless Steel Exposed Surfaces: NAAMM AMP 500; No. 4 polished finish.

2.7 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: Galvanized 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.

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.

E. Install flush access panels in partitions and in gypsum board and plaster ceilings.

3.3 ACCESS DOOR AND FRAME INSTALLATION

A. Wall Installations: Install access doors in openings with sides vertical.

B. Ceiling Installations: Install access doors parallel to ceiling suspension grid or room partitions.

C. Frames without Flanges: Install frame flush with surrounding finish surfaces.

D. Frames with Flanges: Overlap opening, with face uniformly spaced from finish surface.

E. Recessed Panel Access Doors: Install with face of surrounding materials flush with door panel installed finish.

F. Secure frames to adjacent construction with fasteners.

G. Install type, size and quantity of anchoring device suitable for material surrounding opening to maintain alignment, and resist displacement, during normal use of access door.

H. Field Painting Primed Access Doors: Comply with the requirements of Section 09 91 00, PAINTING.

3.4 ADJUSTMENT

A. Adjust hardware so door panel opens freely.

B. Adjust door when closed so door panel is centered in frame.

- - E N D - -

SECTION 08 34 00
SLIDING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior Aluminum-Framed Top-Hung Sliding Doors.

1.2 RELATED REQUIREMENTS

A. Interior Wood Doors: Section 08 14 00

1.3 APPLICABLE PUBLICATIONS

A. ANSI – American National Standards Institute

1. ANSI 156.18 Materials and Finishes.
2. ANSI A117.1 Specifications for making buildings and facilities usable by physically handicapped people.

B. BHMA – Builders Hardware Manufacturers Association

C. DHI – Door and Hardware Institute

D. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 101 – Life Safety code
3. NFPA 105 – Smoke and Draft Control Door Assemblies
4. NFPA 252 – Fire Tests of Doors Assemblies

E. AWS – Architectural Woodwork Standards

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23 Shop Drawings, Product Data and Samples.

B. Shop Drawings: Submit manufacturer’s shop drawings, including plans, elevations, sections, and details, indicating dimensions, tolerances, materials, components, hardware, finish, options, and accessories. Shop Drawings to show required blocking by others.

C. Product Data: Submit manufacturer’s product data, including installation instructions.

D. Samples: Submit manufacturer’s samples of aluminum frame finish sample.

E. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Warranty Documentation: Submit manufacturer’s standard warranty for complete system.

G. Test Reports: Submit acoustical reports or UL 1784 as applicable.

1.5 QUALITY ASSURANCE

A. Obtain sliding aluminum frame hardware from single source.

B. Manufacturer's Qualifications: Manufacturer regularly engaged for past 5 years in manufacture of sliding doors similar to that specified.

1.6 PERFORMANCE

A. Aluminum perimeter frames with integral acoustic seals at all door/frame interfaces.

B. Soft self-closing mechanism at both sides of door integrated with top track. Soft Closers tested to a minimum of 150,000 cycles.

C. Concealed door guide.

D. Manufacturer to 3rd party acoustical performance test data.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Notify manufacturer immediately of any shipping damage.

C. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area indoors.
4. Protect materials and finish during storage, handling, and installation to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design equal to products by AD SYSTEMS 2201 100th St. SW, Everett, WA 98204.

1. ExamSlide High Performance Barn (Sliding) Door System by AD Systems.

B. Wall Thickness: Field verify typical 6" stud with 5/8" GWB each side.

C. Frame Profiles: Extruded aluminum frame "wrap" frame with integral vertical jamb (site pocket). Frames required to complete seal around door leaf. Gasketing required at all frame to door interfacings. Exposed gaskets at jamb to be silicone.

D. Finish:

1. Manufacturer's Standard Painted Hardcoat (Kynar)Finish: Meets AAMA 2604 Standard Colors.
2. Submit sample for review and approval.

E. Door Leafs. All Doors to be factory machined for hardware including pilot and function holes. Leading edge of door to be fully finished. Door prep requirements to be forwarded to Door Manufacturer.
   1. Refer to Section 08 14 00 for specified 1-3/4” Flush Wood Door with Acrovyn laminate facing.

F. Door Frame Components:
   1. Single Top Track: Anodized finish aluminum track.
   2. Valance: Sloped, extruded aluminum valance with integral end caps.
   3. Top Rollers: Tandem nylon roller sized to match door weight.
   4. Concealed Floor Guide: Integral Jamb floor guide by AD Systems.
   5. Soft-Closer: Soft and self-closing damper mechanism at one or both sides of door leaf. Demonstrate closers as tested to 150k cycles.
   6. Handles: Standard Ladder Pull: 16” long x 1” diameter.
      Finish: US32D satin Stainless Steel.
   7. Door Locks: See Door Schedule for locations.
      Choose 1 below:
      a. Not Required (typical)
      b. Mortise Latch: ADA-2 Thumbturn with Indicator.
   8. Automatic Door Bottom for improved acoustical performance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine wall to verify sliding door opening is plumb, level, and square.

B. Field verify dimensions of wall openings.

C. Examine surfaces to receive top and bottom guide.

D. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install sliding doors in accordance with manufacturer’s instructions at locations indicated on the Drawings.

B. Install sliding doors plumb, level, square, and in proper alignment.

C. Install sliding doors to close against walls without gaps.

D. Install sliding doors to open and close smoothly.

E. Anchor sliding doors securely in place to supports. Provide Fire treated 2 x 6 blocking full length of track.

3.3 ADJUSTING

A. Adjust sliding doors for proper operation in accordance with manufacturer’s instructions.

B. Adjust sliding doors to operate smoothly without binding.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

3.4 CLEANING

A. Clean sliding doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage materials or finish.

3.5 PROTECTION

A. Protect installed sliding doors from damage during construction.

- - - E N D - - -

SECTION 06 2F FH
ARPYINPY1-GAYEL ENTGANCES

.AGT F 1 UENEGAR

FMF SPYYAGD

A. Section Includes:
   1. Interior sliding glass doors.

FMQ GERATEL GE3PIGEYENTS

A. Door Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Glass and Glazing: Section 08 80 00, GLAZING.
C. Hardware: Section 08 71 00, DOOR HARDWARE.

FMH A..RICABRE .PBRICATIONS

A. Comply with references to extent specified in this section.
B. American Architectural Manufacturers Associations (AAMA):
   1. 2604-13 - Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
C. American Welding Society (AWS):
   1. D1.2/D1.2M-14 - Structural Welding Code - Aluminum.
D. ASTM International (ASTM):
   1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   2. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
   3. B221M 13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
   4. F593-13a - Stainless Steel Bolts, Hex Cap Screws, and Studs.
E. National Association of Architectural Metal Manufacturers (NAAMM):
   1. AMP 500-06 - Metal Finishes Manual.

FM2 .GEINSTARRATION YEETINUS

A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.

FM4 SPBYITTARS

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.
   2. Show anchorage and reinforcement.
   3. Show interface and relationship to adjacent work.
C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Doors, each type.

3. Installation instructions.
4. Warranty.

D. Samples:
1. Aluminum Anodized Finish:

E. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

F. Certificates: Certify each product complies with specifications.

G. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.

FM5 3PARITD ASSPGANCE

A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

B. Installer Qualifications: Manufacturer authorized representative.
1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.

C. Welders and Welding Procedures Qualifications: AWS D1.2/D1.2M.

FMV LERI,EGD7 STOGAUE ANL 8ANLRINU

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.

D. Store products indoors in dry, weathertight facility.

E. Protect products from damage during handling and construction operations.

FM6 WAGGANTD

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

.AGT Q 1 .GOLPCTS

QMF YANP-ACTPGEG

A. Manufacturer: Equal to Besam AASA ABLOY VersaMax 2.0 Sliding ICU Door, 1900 Airport Road, Monroe, NC 28110.
1. Sliding panels, sidelites and aluminum frame.
2. Entrance header, guide system and carrier assemblies.

3. Single slide, full breakout, ICU/CCU door system.
   a. Operation: Manually operated.
   b. Configuration: Single slide, two equal panel unit with one operable leaf and one sidelite.
   c. Minimum Clear Door Opening Width: 35-1/2 inches for 7’-0” unit width.
   d. Breakaway Capability: Sliding leaf and sidelite.
   e. Mounting: Overhead header installed between jambs.

QMQ ENTGANCE COY.ONENTS

A. Stile and Rail Sliding Panels and Sidelites:
   1. Material: Extruded Aluminum, Alloy 6063-T5 or 6063-T6.
   2. Door panels shall have a minimum .125 (3.2 mm) structural wall thickness including adjoining perimeter frames where applicable.
      a. Aluminum extrusions shall allow for a factory installed, slide-in type gasket.
   3. Door construction shall be by means of an integrated corner clip with 3/8-inch diameter all-thread through bolt from each stile.
      a. Face of door stiles shall be flush with adjacent rails and muntin.
   4. Glass stops shall be .062-inch (15.8 mm) wall thickness and shall provide security function as a standard by means of a fixed non-removable exterior section with glazing to be performed from the interior only.
   5. Vertical Stiles shall be medium stile 4 inch (102 mm).
   6. Bottom Rails shall be 7 inches (178 mm).
   7. Intermediate Muntin shall be 1-3/4 inch (45 mm).
   8. Smoke Gasketing: Slide-in type, replaceable, smoke type gasket that is capable of withstanding 400° F for a minimum of 30 minutes.
      a. Bottom rails shall be provided with a concealed adjustable sweep gasket that is capable of withstanding exposure to 400° F for a minimum of 30 minutes.
   9. Glass: Glazing shall comply with ANSI Z97.1, thickness as indicated.
      a. Privacy Glazing Sliding Panels and Sidelite Panels: ASSA ABLOY InteGlass™ Switchable Privacy Glass:
         1) Thickness: 7/16 inch (11 mm) overall thickness, laminated switchable privacy glass consisting of an electrified privacy film interlayer laminated between two pieces of clear 3/16 inch (5 mm) tempered glass panes.

2) Electrified glass panels supplied with the required bus bar, conductors, and nipple.
   a) Films and interlayers to be hermetically sealed around all edges, protected from moisture.
   b) Components/electrical connectors to be concealed and isolated from user.
3) Operation: Power "on" glass in clear state, power "off" glass in opaque state. No electricity is consumed when glass is in the opaque state.
4) Electrical:
   a) Operating Voltage: 110 – 120 VAC / 50 - 60 Hz.
   b) Operating Current: .012 Amps (12 mA/sq. ft).
   c) Power Consumption: less than 1 watt/sq. ft of privacy glass.
   d) Surge protection module.
5) Electrical Devices and Connections: Wall switches, wiring, electrical splice box, connectors, conduit by Division 26 and 28 Sections.
6) Glazing Installation: Dry glazing; wet glazing not allowed.

B. Door Carriers: Manufacturer's standard carrier assembly that allows vertical adjustment.
   1. Sliding Panel Door Carriers:
      a. Roller Wheels: Two heavy duty Delrin roller wheels per wheel assembly, for a total of four (4) roller wheels, 1-7/16-inch (36.51 mm) diameter, per active door leaf for operation over a replaceable aluminum track. Single journal with sealed oil impregnated bearings.
      b. Two (2) heavy duty self-aligning anti-risers per leaf.

C. Framing Members: Provide ICU/CCU entrances as complete assemblies. Manufacturer's standard extruded aluminum framing reinforced as required to support loads.
   1. Vertical Jambs: 1-3/4 inches (44.5 mm) by 4-1/2 inches (114.3 mm).

D. Header: Extruded aluminum header with a replaceable aluminum track, mounted between the jambs and extending full width of entrance. Header to conceal door operators, carrier assemblies, and roller track, complete with hinged access panel for service and adjustment.
   1. Header Capacity: Capable of supporting active breakout leafs up to maximum of 220 lb. (100 kg) per leaf.

2. Header Size: 4-1/2 inches (114.3 mm) wide by 4-1/2 inches (114.3 mm) high.
3. Smoke Gasketing: Slide-in type, replaceable, smoke type gasket that is capable of withstanding 400o F for a minimum of 30 minutes.
4. Header Access: Continuous hinge at top of header allows cover to swing and allow complete access to operator and internal electronic and mechanical assemblies.

E. Anti-Static Grounding: Fabricate ICU/CCU entrances to be internally grounded to reduce static shock.

F. Electrified Power Transfer: Concealed power transfer from header to both sliding and sidelite panels. Power transfer to allow continuous power to sliding panels at all positions during the sliding and breakout operations.
1. The power transfer system shall be rated at 5 amps (600 watts) at 120 VAC maximum.
a. Cable shall be 18 AWG stranded RoHS compliant UL listed 600V cable with a temperature range of -50 to 90°C, with a dynamic bend radius of 6X cable diameter and have a pull tension of 51 lbs. maximum. Cable shall be able to withstand 8M cycles at rated dynamic bend radius.

QMH 8AGLWAGE

A. Provide manufacturer's standard hardware as required for operation indicated.
1. Breakaway arms and bottom pivot assembly shall allow panels to breakout to 90 degrees. Force to breakout sliding panel adjustable to maximum 60 lbf (222N).
2. Nurse Assist magnetic catch(s)to retain breakout door and sidelite panels in the closed position.
3. Latching hardware shall be provided as indicated.
a. Positive Latch: Mortise type self-latching hookbolt, BHMA A156.5, Grade 1 with lever handles on each side. Lever Style: End of lever to have a return towards door face.
b. Automatic releasing/latching, concealed magnetic bolt shall allow breakout of sidelite panel(s) when sliding panel in full open position.
4. Guide Track/Threshold: Manufacturer's threshold as indicated.
a. Full Breakout Trackless Design: Floor mounted guide track and threshold not allowed. Breakout from a full open position only.

QM2 ARPYINPY -INIS8ES

A. Anodized Finish:
   1. AAMA 611, Clear, AA-M12C22A41, Class I, 0.018mm.

B. MicroShield™ antimicrobial silver-based ion, baked-on enamel finish on all exposed surfaces including door pulls, door extrusions, rails and header.
   1. Antimicrobial finish must permanently suppress the growth of bacteria, algae, fungus, mold and mildew by the controlled release of silver ions that attach microbes and inhibit the growth on the treated surfaces.
   2. Coating to be EPA registered resulting in a safe and non-toxic finish; chlorinated or synthetic chemical finishes will not be accepted.

.AGT H 1 EXECPTION

HMF .GE.AGATION

A. Examine and verify substrate suitability for product installation.
   1. Coordinate floor closer installation recessed into concrete slabs.
   2. Coordinate anchor installation built into masonry and concrete.

B. Protect existing construction and completed work from damage.

C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

D. Apply dielectric tape or barrier coating to aluminum surfaces in contact with dissimilar metals to minimum 0.7 mm (30 mils) dry film thickness.

HMQ INSTARRATION 1 UENEGAR

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 aluminum framed entrances and storefronts plumb and true, in alignment and to lines shown on drawings.

C. Anchor frames to adjoining construction at heads, jambs and sills.

D. Switchable Privacy Glass: Connect switchable privacy glass to electrical power distribution system as specified in Division 26 Sections.

E. Headers are to be anchored to overhead framing per manufacturer’s recommendations.

F. The framing surrounding the opening needs to be capable of supporting no less than 440 lbs. for single slide. This is a double the weight of the door panel safety factor.
G. Adjust doors and hardware uniform clearances and proper operation.
H. Touch up damaged factory finishes.
I. Tolerances:
   1. Variation from Plumb, Level, Warp, and Bow: Maximum 3 mm in 3 m (1/8 inch in 10 feet).
   2. Variation from Plane: Maximum3 mm in 3.65 m (1/8 inch in 12 feet); 6 mm (1/4 inch) over total length.
   3. Variation from Alignment: Maximum 1.5 mm (1/16 inch) in-line offset and maximum3 mm (1/8 inch) corner offset.
   4. Variation from Square: Maximum 3 mm (1/8 inch) diagonal measurement differential.

HMH .GOTECTION7 CREANINU ANL GE.AIGINU

A. Clean exposed aluminum and glass surfaces. Remove contaminants and stains.
B. Protect aluminum-framed entrances and storefronts from construction operations.
C. Remove protective materials immediately before acceptance.
D. Repair damage.

- - - E N D - - -

SECTION 07 92 00
JOOL PALJRALE

1ENELA-

2G2 CONJITIONS

A. Conditions of the contract (General and Supplementary Conditions) and Division One General Requirements, govern the work of this section.

B. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings, or specified herein.

C. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.

D. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

2G. ROLD INC-:JEJ

A. This section includes the following:

1. Furnish door hardware (for hollow metal, wood and aluminum doors) specified herein, listed in the hardware schedule, and/or required by the drawings.
2. Electro-Mechanical Devices
3. Access Control components and or systems specified within this section.

B. Where items of hardware are not definitely or correctly specified and is required for the intended service, such omission, error or other discrepancy should be directed to the Architect prior to the bid date for clarification by addendum. Otherwise furnish such items in the type and quantity established by this specification for the appropriate service intended.

2GW LE-ATEJ ROLD IN OTPEL SECTIONS

A. This section includes coordination with related work in the following sections:

1. Division 6 Section "Finish Carpentry".
2. Division 6 Section "Cabinet Hardware".
3. Division 8 Section "Hollow Metal Doors and Frames".
4. Division 8 Section "Wood Doors".
5. Division 8 Section “Sliding Doors”.
6. Division 8 Section “Aluminum-Framed Entrances”.
7. Division 28 Sections "Electrical".

2GK LE(ELENCES

A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.

1. DHI - Recommended Locations for Builders' Hardware.
2. NFPA 80 - Standards for Fire Doors and Windows.
3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
4. UL - Building Material Directory.
5. DHI - Door and Hardware Institute

6. WHI - Warnock Hersey
7. BHMA - Builders Hardware Manufacturers Association
8. ANSI – American National Standards Institute
9. IBC 2012 - International Building Code 2015 Edition (as amended by local building code)

2GU S:BMITTA-S

A. Within ten days after award of contract, submit detailed hardware schedule in quantities as required by Division 1 - General Conditions.

B. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door & Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets shall be consolidated to group multiple door openings which share similar hardware requirements. Schedule shall include the following information:

1. Door number, location, size, handing, and rating.
2. Door and frame material, handing.
3. Degree of swing.
4. Manufacturer
5. Product name and catalog number
6. Function, type and style
7. Size and finish of each item
8. Mounting heights
9. Explanation of abbreviations, symbols, etc.
10. Numerical door index, indicating the hardware set/ group number for each door.

C. When universal type door closers are to be provided, the schedule shall indicate the application method to be used for installation at each door: (regular arm, parallel arm, or top jamb).

D. The schedule will be prepared under the direct supervision of a certified Architectural Hardware Consultant (AHC) employed by the hardware distributor. The hardware schedule shall be signed and embossed with the DHI certification seal of the supervising AHC. The supervising AHC shall attend any meetings related to the project when requested by the architect.

E. Check the specified hardware for suitability and adaptability to the details and surrounding conditions.

F. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate unsuitable or in compatible items, and proposed substitutions in the hardware schedule.

G. Provide documentation for all hardware to be furnished on labeled fire doors indicating compliance with positive pressure fire testing UL 10C.

H. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 1 - General Conditions.

I. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish, style, and function as specified herein. Tag each sample with its permanent location so that it may be used in the final work.

J. Furnish with first submittal, a list of required lead times for all hardware items.

K. After final approved schedule is returned, transmit corrected copies for distribution and field use in quantities as required by Division 1 - General Conditions.

L. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related trades.

M. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical devices or systems as required by related trades. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

N. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the owner's representative to determine keying requirements. Upon completion of the initial key meeting, hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the door and hardware institute's publication "Keying Procedures, Systems, and Nomenclature". Submit copies of owner approved key schedule for review and field use in quantities as required by Division 1 - General Conditions. Wiring diagrams shall be included in final submittals transmitted for distribution and field use.

2GH F:A-IT) ASS:LANCE

A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items by approved manufacturers that are equal in design, function, and quality, may be considered for prior approval of the architect, provided the required data and physical samples are submitted for approval as set forth in Division One General Requirements.

B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products shall meet or exceed certification requirements for the respective grade indicated within this specification. Supplier shall provide evidence of certification when requested by the architect.

C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Electrical drawings and electrical specifications are based on the specific electrified hardware components specified in hardware sets. When electronic hardware components other than those indicated in hardware sets are provided, the supplier shall be responsible for all costs incurred by the design team and their consultants to review and revise electrical drawings and electrical specifications. Supplier shall also be responsible for any additional costs associated with required changes in related equipment, materials, installation, or final hook up to insure the system will operate and function as indicated in the construction documents, including hardware set operational / functional descriptions.

E. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.

F. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.

G. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.

H. Provide hardware for all labeled fire doors, which complies with positive pressure fire testing UL 10C.

I. Comply with all applicable provisions of the standards referenced within section 1.4 of this specification.

J. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved items.

2G9 JE-I3EL)Q STOLA1E ANJ PANJ-IN1

A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.

B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and door number.

C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection against loss and damage at job site.

D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and hardware supplier immediately after receipt of material at the job site.

E. Coordinate with related trades under the direction of the contractor for delivery of hardware items necessary for factory installation.

2G7 YLE4INSTA--ATION MEETIN1

A. Schedule a hardware pre-installation meeting on site to review and discuss the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.

B. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.

C. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

2G5 RALLANT)

A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division One General Requirements.

B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

YALT . 4 YLOJ:CTS

.G2 (ASTENELS

A. All exposed fasteners shall be Phillips head or as otherwise specified, and shall match the finish of the adjacent hardware. All fasteners exposed to the weather shall be non-ferrous or stainless steel. Furnish correct fasteners to accommodate surrounding conditions.

B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing through-bolts. Furnish through-bolts as required for materials not readily reinforced.

.G. B:TT PIN1ES

A. Equal to acceptable manufacturers and respective catalog numbers:

	McKinney
1.	T4A3386 32D NRP
2.	T4A3786 32D NRP

B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.1 (2006). Hinges shall meet or exceed the following ANSI grade requirements as indicated below:

1. Standard Weight, Plain Bearing Hinges: Grade 3
2. Standard Weight, 2 Ball Bearing Hinges: Grade 2
3. Heavy Weight, 4 Ball Bearing Hinges: Grade 1

C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.

1. 3 hinges for doors up to 90 inches.
2. 1 additional hinge for every 30 inches on doors over 90 inches.
3. 4 hinges for Dutch door applications.

D. Unless otherwise specified, top and bottom hinges shall be located as specified in division 8 Section "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

E. Unless otherwise specified, furnish hinges for exterior doors, fabricated from brass, bronze, or stainless steel. Unless otherwise specified, hinges for interior doors may be fabricated from steel.

F. Unless otherwise specified, furnish hinges in the following sizes:

1.	4-1/2" x 4-1/2"	1-3/4" thick doors

G. Furnish hinges with sufficient width to accommodate trim and allow for 180-degree swing.

H. Unless otherwise specified, furnish all hinges to template standards.

.GW YOREL TLANS(ELS

A. Equal to acceptable manufacturers and respective catalog numbers:

	Von Duprin	ASSA	ABH
1. Concealed Ten Wire	EPT-10	CEPT-10	PT1000

B. Door cords shall be armored cable with screw on caps.

C. Concealed power transfers shall be concealed in the door and frame when the door is closed.

D. Concealed power transfers shall have a steel tube to protect wires from being cut.

E. Concealed power transfers with spring tubes shall be rejected.

F. Concealed power transfers shall be supplied with a mud box to house all terminations.

.GK (-:SP BO-TS ANJ J:ST YLOO(STLIDES

A. Equal to acceptable manufacturers and respective catalog numbers:

	Ives	Door Controls	Hager
1. Dust Proof Strike	DP2	80	280X
2. Auto Flush Bolt (Metal Door)	FB31P	842	292D
3. Auto Flush Bolt (Wood Door)	FB41P	942	291D
4. Constant Latching Bolt (Metal Door)	FB51P	845	293D
5. Constant Latching Bolt (Wood Door)	FB61P	945	294D
6. Manual Flush Bolt	FB458	780	282D

B. Unless otherwise specified, provide 12" rods for manual flush bolts for door 7'6" or less, 24" top rods for doors over 7'6" to 8'6".

C. Unless otherwise specified, provide doors over 8'6" with automatic top bolts.

D. Provide automatic flush bolts where required to maintain fire door listing and or egress requirements on pairs of doors.

E. All flush-bolt applications shall be UL listed to be installed with top flush-bolt only. Provide auxiliary fire bolt as required for fire rated openings where less bottom bolt has been specified.

F. Provide all bottom flush bolts with non-locking dust proof strikes.

.GU E6IT JE3ICES

A. Equal to acceptable manufacturers and respective catalog numbers:

	Von Duprin
1. Wide Stile, Push Pad	99 Series
2. Wide Stile, Electric Latch Retraction	QEL 99 Series
3. Lever Trim	996 Series
4. Pull Trim	990 Series

B. Exit devices shall be independently certified by ANSI for compliance with ANSI A156.3, Grade 1 (2008).

C. Obtain exit devices from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. All exit devices shall be equipped with a sound-dampening feature to reduce touch pad return noise.

E. Quiet Electric Latch Retraction shall be accomplished using a motor driven assembly, and shall incorporate the following features:

1. Motor shall retract both the push pad assembly and latchbolt.
2. Automatic calibration of latch throw and pull.
3. Built-in time delay.
4. On-board installation and troubleshooting diagnostics built into power supply and device.
5. Retry mode if device does not pull on the first try.

F. On full glass doors there shall be no exposed fasteners on the back of the mechanism visible through the glass.

G. All exit devices shall be provided with flush end caps to reduce potential damage from impact.

H. All exit devices shall be provided with dead-locking latch bolts to ensure security.

I. All exit devices shall be U.L. listed for accident hazard. Exit device for use on fire doors shall also be U.L. listed for fire exit hardware.

J. Provide optional strikes, special length rods, and adapter plates to accommodate door and frame conditions. Provide narrow style series devices in lieu of wide stile series devices where optional strikes will not accommodate door and frame conditions.

K. Coordinate with related trades to ensure adequate clearance and reinforcement is provided in doors and frames. Provide thru bolts as required.

L. Refer to hardware groups for exit device applications utilizing the option of: "less bottom rod and floor strike" (LBR)

M. All exit devices shall be provided with optional trim designs to match other lever and pull designs used on the project.

N. Unless specific exit device dogging options are noted within hardware sets, provide dogging options as follows:

1. Fire Rated devices: Dogging not permitted.
2. Non-Rated Exit Only functions not equipped with outside trim or pull: Less Dogging.
3. Non-Rated Classroom functions: Less Dogging.
4. Non-Rated devices utilizing electric latch retraction or electrified outside trim: Less Dogging.
5. All Other Non-Rated devices: Cylinder Dogging utilizing interchangeable core cylinders. Cylinder keyway shall match locksets furnished on this project.

O. Provide glass bead kits as required to accommodate door conditions. Screws shall not be visible through full glass doors.

P. Where specified, provide compatible keyed mullions with cylinder for pairs of doors.

Q. Provide reinforced crossbars for all traditional style exit devices applied to doors over 36" wide.

.GH -OCDS ANJ -ATCPES

A. Equal to acceptable manufacturers and respective catalog numbers:

	LSDA
1. Grade 1 Cylindrical	LF2000 Series (LE)

B. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011).

C. Unless otherwise specified, all locks and latches to have:

1. 2-3/4" Backset
2. 1/2" minimum throw latchbolt
3. 1" throw deadbolt
4. ANSI A115.2 strikes

D. Provide guarded latch bolts for all locksets, and latch bolts with sufficient throw to maintain fire rating of both single and paired door assemblies.

E. Length of strike lip shall be sufficient to clear surrounding trim.

F. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar covers.

.G9 C-OSELS

A. Equal to acceptable manufacturers and respective catalog numbers:

	LCN
1.	1460 REG / EDA
2.	4040XP / 4040XP EDA

B. Door closers shall be independently certified by ANSI for compliance with ANSI A156.4, Grade 1 (2013).

C. Obtain door closers from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Provide extra heavy-duty arm (EDA / HD) when closer is to be installed using parallel arm mounting.

E. Closers shall use high strength cast iron cylinders, forged main arms, and 1-piece forged steel pistons.

F. Closers shall utilize a stable fluid withstanding temperature range of +120deg F to -30deg F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UL10C.

G. Unless otherwise specified, all door closers shall have full covers and separate adjusting valves for sweeps, latch, and backcheck.

H. Provide closers for all labeled doors. Provide closer series and type consistent with other closers for similar doors specified elsewhere on the project.

I. Provide closers with adjustable spring power. Size closers to insure exterior and fire rated doors will consistently close and latch doors under existing conditions. Size all other door closers to allow for reduced opening force not to exceed 5 lbs.

J. Install closers on the room side of corridor doors, stair side of stairways and interior side of exterior doors.

K. Closers shall be furnished complete with all mounting brackets and cover plates as required by door and frame conditions, and by adjacent hardware.

L. Door closers shall be provided with a powder coat finish to provide superior protection against the effects of weathering. Powder coat finish shall successfully pass a **V**100-hour salt spray test,

M. Pressure Relief Valve, PRV, shall not be acceptable.

.G7 DICD Y-ATES ANJ MOY Y-ATES

A. Furnish protective plates as specified in hardware groups.

B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified, metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.

C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be beveled 4 sides and counter sunk.

Protection plates over 16" shall not be provided for labeled doors unless specifically approved by door manufacturers listing.

D. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide edges with cutouts as required adjacent hardware.

E. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for cylinders or other mortised hardware.

.G5 O3ELPEAJ STOYS

A. Equal to acceptable manufacturers and respective catalog numbers:

	Glynn-Johnson	Rixson	Sargent
1. Heavy Duty Surface Mount	GJ900 Series	9 Series	590
2. Heavy Duty Concealed Mount	GJ100 Series	1 Series	690

B. Unless otherwise specified, furnish GJ900 series overhead stop for hollow metal or 1-3/4” solid core doors equipped with regular arm surface type closers that swing more than 140 degrees before striking a wall, for hollow metal or 1-3/4” solid core doors that open against equipment, casework, sidelights, or other objects that would make wall bumpers inappropriate, and as specified in hardware groups.

C. Furnish hex bolt attachments for wood and mineral core doors unless doors are supplied with proper reinforcing blocks.

D. Do not provide holder function for labeled doors.

.G20 RA-- STOYS ANJ PO-JELS

A. Equal to acceptable manufacturers and respective catalog numbers:

	Ives	Hager	Burns
1. Wrought Convex Wall Bumper	WS406CVX	232W	570
2. Wrought Concave Wall Bumper	WS406CCV	236W	575

B. Furnish a stop or holder for all doors. Furnish floor stops or hinge pin stops only where specifically specified.

C. Where wall stops are not applicable, furnish overhead stops.

D. Do not provide holder function for labeled doors.

.G22 REATPELSTLIYQ 1ASDETIN1

A. Equal to acceptable manufacturers and respective catalog numbers:

	Zero	Pemko	NGP	Reese
1. Adhesive Gasket	188	S88	5050	797

B. Weatherstrip and gasketing shall be independently certified by ANSI for compliance with ANSI A156.22 (2005).

C. Where specified in the hardware groups, furnish the above products unless otherwise detailed in groups.

D. Provide weatherstripping all exterior doors and where specified.

E. Provide intumescent and other required edge sealing systems as required by individual fire door listings to comply with positive pressure standards UL 10C.

F. Provide Zero 188 smoke gaskets at all fire rated doors and smoke and draft control assemblies.

G. Provide gasketing for all meeting edges on pairs of fire doors. Gasketing shall be compatible with astragal design provided by door supplier as required for specific fire door listings.

.G2. E-ECTLIC STLIDES

A. Equal to acceptable manufacturers and respective catalog numbers:

	Von Duprin	Folger Adams
1. Type 1	6000 Series	300 Series

B. Provide electric strikes designed for use with the type of locks shown at each opening where specified.

C. Electric strikes shall be UL listed as Burglary-Resistant Electric Door Strikes and where required shall be UL listed as Electric Strike for Fire Doors.

D. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

.G2W MA1NETIC -OCDS

A. Equal to acceptable manufacturers and respective catalog numbers:

	Schlage Electronics	Securit ron
1. Direct Hold	M490 Series	82B

B. Provide magnetic locks as specified, complete with mounting brackets and fasteners appropriate to the application. Direct Hold magnetic locks shall have a minimum of 1500 lbs. holding force.

C. Provide magnetic locks with integral magnetic bond sensor, time delay (1-90 Seconds) for re-locking, and LED status indicator as noted in hardware groups.

D. Provide regulated and filtered power supplies for magnetic locks by the same manufacturer.

.G2K YOREL S:YY-IES

A. Provide quantities and types as specified in hardware sets. Shared power supplies will not be accepted without prior approval from the owner.

B. All power supplies shall have the following features:

1. 12/24 VDC Output, field selectable.
2. Class 2 Rated power limited output.
3. Universal 120-240 VAC input.
4. Low voltage DC, regulated and filtered.
5. Polarized connector for distribution boards.
6. Fused primary input.
7. AC input and DC output monitoring circuit w/LED indicators.
8. Cover mounted AC Input indication.

9. Tested and certified to meet UL294.
10. NEMA 1 enclosure.
11. Hinged cover w/lock down screws.
12. High voltage protective cover.

C. All power supplies shall incorporate fused distribution boards.

D. All electro-mechanical systems requiring fail safe circuits shall be capable of interfacing with the fire alarm system to cut power to appropriate system components. Unless already provided in another system component, all power supplies utilized in fail safe circuits shall include an integral relay which when connected to the N/C fire alarm contact will cut power to all openings connected to the individual power supply. Power supply, unless otherwise specified, will automatically reset itself when fire alarm relay returns to normal state following a fire alarm.

.G2U JOOL YOSITION SRITCPES

A. Equal to acceptable manufacturers and respective catalog numbers:

	Schlage Electronics	Sentrol	Sarge nt
1. Concealed (wood & hollow metal doors)	679 Series	1076W	3287

.G2H MAN:A--) YLO1LAMMEJ -OCDS

A. Equal to acceptable manufacturers and respective catalog numbers:

	Simplex	No Substitution
1. Cylindrical Lockset	L1000 Series	

B. Provide locks with mechanical key override.

C. Provide cylinders as required

D. Lever trim shall match locksets when available.

E. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2, Grade 1 (2011). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13, Grade 1 (2012).

F. Lockset shall be listed and certified for compliance with UL 294.

G. Keypad operation

H. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.

I. Hardware supplier shall provide onsite training to the end user as required by the manufacturer.

.G29 (INISPES ANJ BASE MATELIA-S

A. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the following finish schedule:

HARDWARE ITEM	BHMA FINISH AND BASE MATERIAL
1. Butt Hinges: Exterior, or Non-Ferrous	630 (US32D - Satin Stainless Steel)
2. Butt Hinges: Interior	652 (US26D - Satin Chromium)
3. Continuous Hinges	630 (US32D - Satin Stainless

	Steel)
4. Exit Devices	626 (US26D - Satin Chromium)
5. Locks and Latches	626 (US26D - Satin Chromium)
6. Pulls and Push Plates/Bars	630 (US32D - Satin Stainless Steel)
7. Closers	689 (Powder Coat Aluminum)
8. Protective Plates	630 (US32D - Satin Stainless Steel)
9. Overhead Stops	630 (US32D - Satin Stainless Steel)
10. Wall Stops and Holders	630 (US32D - Satin Stainless Steel)
11. Thresholds	628 (Mill Aluminum)
12. Weather-strip, Sweeps Drip Caps (wood and hollow metal doors)	Aluminum Anodized
13. Weather-strip, Sweeps Drip Caps (aluminum doors)	Match finish of aluminum doors.
14. Miscellaneous	626 (US26D - Satin Chromium)

.G27 DE)IN1

A. Provide all cylinders in keyways as required to accommodate owners existing Falcon Great Grand Master Key System.

B. Provide interchangeable cores for all locks and cylinders.

C. All locks under this section shall be keyed as directed by the owner to an existing Master Key System.

D. Furnish a total of 2 keys per cylinder. Actual cut keys to be determined by owner.

E. Master keys, control keys, and change keys shall be delivered by registered mail to the owner. Construction keys shall be delivered to the contractor.

F. Cylinders shall be 6 pin “D” keyway, uncombinated standard cores.

YALT W 4 E6EC:TION

WG2 E6AMINATION

A. Prior to installation of hardware, installer shall examine door frame installation to ensure frames have been set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed with hardware installation until such deficiencies have been corrected.

WG. INSTA--ATION

A. Before hardware installation, general contractor/construction manager shall coordinate a hardware installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedule, templates and physical products samples.

B. Install all hardware in accordance with the approved hardware schedule and manufacturers instructions for installation and adjustment.

C. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accord with industry standards.

E. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.

F. Shim doors as required to maintain proper operating clearance between door and frame.

G. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builder’s hardware for standard doors and frames as published by the Door and Hardware Institute.

H. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.

I. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.

J. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.

K. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the label.

L. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.

M. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.

N. Install wall stops to contact lever handles or pulls. Do not mount wall stops on casework, or equipment.

O. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.

P. Overhead stops used in conjunction with electrified hold open closers shall be templated and installed to coincide with engagement of closer hold open position.

Q. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.

R. Adjust spring power of door closers to the minimum force required to insure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to ensure opening force does not to exceed 5 lbs.

S. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes.

T. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted seal. Adjust templating for parallel

arm door closers, exit devices, etc., as required to accommodate weatherstripping.

U. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.

V. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water-resistant seal.

W. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

WGW (IE-J F:A-IT) CONTLO-

A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware supplier shall submit a list of all hardware that has not been installed correctly.

B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware. Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

WGK AJ8:STMENT ANJ C-EANIN1

A. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to and verify proper operation of all door closers and other items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.

WGU PALJRALE SCPEJ:-E

A. The following schedule of hardware groups are intended to describe opening function. The hardware supplier is cautioned to refer to the preamble of this specification for a complete description of all materials and services to be furnished under this section.

PR SETX 00

ALL HARDWARE BY ACCORDION FOLDING PARTICIAT SUPPLIER

PR SETX 02

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PASSAGE SET	F75	LOC
1	EA	WALL STOP	L22251	IVE

FUNCTION: (F75) PASSAGE LATCH
BOTH LEVERS ALWAYS UNLOCKED.

PR SETX 0.

1	EA	SLIDING DOOR	EXAM SLIDE ADA-2 X DROP SEAL By SECTION 08 34 00	ADS

THUMBTURN WITH INDICATOR AND LADDER PULL.

PR SETX 0W

1	EA	SLIDING DOOR	EXAM SLIDE X PULLS By SECTION 08 34 00	ADS

NONLATCHING WITH LADDER PULLS.

PR SETX 0K

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PRIVACY LOCK	F76	LOC
1	EA	WALL STOP	L22251	IVE
1	EA	GASKETING	R0E154	ZER

FUNCTION: (F76) BATH/BEDROOM PRIVACY LOCK
PUSH-BUTTON LOCKING. CAN BE OPENED FROM OUTSIDE WITH SMALL SCREWDRIVER. TURNING INSIDE LEVER OR CLOSING DOOR RELEASES BUTTON.

PR SETX 0U

	EA	HINGES	AS SPECIFIED	MCK
1	EA	ENTRY LOCK	F109	LOC
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	WALL STOP	L22251	IVE

FUNCTION: (F109) OFFICE/ENTRANCE LOCK
TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSH-BUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER.

PR SETX 0H

	EA	HINGES	AS SPECIFIED	MCK
1	EA	STOREROOM LOCK	F86	LOC
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	OH STOP	C52541	GLY

FUNCTION: (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

PR SETX 09

	EA	HINGES	AS SPECIFIED	MCK
1	EA	MANUAL FLUSH BOLT	FB458	IVE
1	EA	STOREROOM LOCK	F86	LOC
1	EA	IC CYLINDER	AS REQUIRED	FAL
2	EA	WALL STOP	L22251	IVE

FUNCTION: (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

PR SETX 07

	EA	HINGES	AS SPECIFIED	MCK
1	EA	STOREROOM LOCK	F86	LOC
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	ELECTRIC STRIKE	E09321 (FAIL SECURE)	VON
1	EA	SURFACE CLOSER	C02011	LCN
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE
1	EA	WALL STOP	L22251	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
1	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS902 2RS	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.
PRESENTATION OF VALID CREDENTIAL MOMENTARILY ENERGIZES ELECTRIC STRIKE.

PR SETX 05

	EA	HINGES	AS SPECIFIED	MCK
1	EA	CLASSROOM LOCK	F84	LOC
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	ELECTRIC STRIKE	E09321 (FAIL SECURE)	VON
1	EA	AUTO OPERATOR	PUSH SIDE	STA
2	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE
1	EA	WALL STOP	L22251	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
1	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS902 2RS	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: (F84) CLASSROOM LOCK
OUTSIDE LEVER LOCKED AND UNLOCKED BY KEY. INSIDE LEVER ALWAYS UNLOCKED.
OUTSIDE ACTUATOR IS CONTROLLED BY THE ACCESS CONTROL SYSTEM OR THE EXTERIOR ON/OFF SWITCH. THE INSIDE ACTUATOR IS ALWAYS ACTIVE TO ENERGIZE STRIKE AND OPEN DOOR.

PR SETX 20

	EA	HINGES	AS SPECIFIED	MCK
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	QEL-9927-L-DT-LBR TYPE 2 LBR	VON
1	EA	ELEC PANIC HARDWARE	QEL-9927-L-NL-LBR TYPE 2 LBR	VON
1	EA	JUNCTION BOX	JB7 W/RELAYS AS REQD	VON
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	OH STOP	C52541	GLY
1	EA	AUTO OPERATOR	PUSH SIDE / PUSH SIDE	STA
2	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
2	EA	KICKPLATE	J102 .050 10" X 1" LDW	IVE
2	EA	WALL STOP	L22251	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
2	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS904 4RL	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: ANSI 03 (NL) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD AND OUTSIDE BY KEY IN CYLINDER. DOOR LOCKS WHEN KEY IS REMOVED AND DOOR IS CLOSED.
FUNCTION: ANSI 02 (DT) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD. PRESENTATION OF VALID CREDENTIAL MOMENTARILY UNLOCKS DOOR.
ACTUATORS RETRACT LATCHES AND ACTIVATE AUTO OPERATOR TO OPEN THE DOOR LEAFS.
OUTSIDE ACTUATOR IS CONTROLLED BY THE ACCESS CONTROL SYSTEM. INSIDE ACTUATOR IS ALWAYS ACTIVE.

PR SETX 22

	EA	HINGES	AS SPECIFIED	MCK
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-L-NL TYPE 1	VON
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	AUTO OPERATOR	PUSH SIDE	STA
2	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE
1	EA	WALL STOP	L22251	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
1	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS902 2RS	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: ANSI 03 (NL) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD AND OUTSIDE BY KEY IN CYLINDER. DOOR LOCKS WHEN KEY IS REMOVED AND DOOR IS CLOSED. PRESENTATION OF VALID CREDENTIAL MOMENTARILY UNLOCKS DOOR.
OUTSIDE ACTUATOR IS CONTROLLED BY THE ACCESS CONTROL SYSTEM. THE INSIDE ACTUATOR IS ALWAYS ACTIVE TO RETRACT LATCH AND OPEN DOOR.

PR SETX 2.

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PANIC HARDWARE	LD-99-L-NL TYPE 1	VON
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	SURFACE CLOSER	C02021	LCN
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE
1	EA	WALL STOP	L22251	IVE

FUNCTION: ANSI 03 (L-NL) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD AND OUTSIDE BY KEY IN CYLINDER. DOOR LOCKS WHEN KEY IS REMOVED AND DOOR IS CLOSED. NO DOGGING.

PR SETX 2W

	EA	HINGES	AS SPECIFIED	MCK
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	QEL-9927-EO-LBR TYPE 2 LBR	VON
1	EA	ELEC PANIC HARDWARE	QEL-9927-L-NL-LBR TYPE 2 LBR	VON
1	EA	JUNCTION BOX	JB7 W/RELAYS AS REQD	VON
1	EA	IC CYLINDER	AS REQUIRED	FAL
2	EA	OH STOP	C52541	GLY
1	EA	AUTO OPERATOR	PUSH SIDE / PUSH SIDE	STA
2	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
2	EA	ARMORPLATE	J101 .050 34" X 1" LDW	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
2	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS904 4RL	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: ANSI 03 (NL) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD AND OUTSIDE BY KEY IN CYLINDER. DOOR LOCKS WHEN KEY IS REMOVED AND DOOR IS CLOSED.
FUNCTION: ANSI 01 (EO) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD. PRESENTATION OF VALID CREDENTIAL MOMENTARILY UNLOCKS DOOR.
ACTUATORS RETRACT LATCHES AND OPEN THE DOORS.
OUTSIDE ACTUATOR IS CONTROLLED BY THE ACCESS CONTROL SYSTEM. INSIDE ACTUATOR IS ALWAYS ACTIVE.

PR SETX 2K

	EA	HARDWARE	BY SECTION 08 41 13

PR SETX 2U

	EA	HINGES	AS SPECIFIED	MCK
2	EA	POWER TRANSFER	EPT10	VON
2	EA	ELEC PANIC HARDWARE	QEL-9927-EO-LBR TYPE 2 LBR	VON
1	EA	JUNCTION BOX	JB7 W/RELAYS AS REQD	VON
1	EA	ROD AND LATCH GUARD	RGO-	VON
1	EA	MAGNETIC LOCK	M490P	SCE
2	EA	OH STOP	C52541	GLY
1	EA	AUTO OPERATOR	DOUBLE EGRESS	STA
1	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
2	EA	KICKPLATE	J102 .050 10" X 1" LDW	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
2	EA	DOOR CONTACT	679-05	SCE
1	EA	POWER SUPPLY	PS904 4RL	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: (EO) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD.
PRESENTATION OF VALID CREDENTIAL MOMENTARILY DEENERGIZES MAGNETIC LOCK, RETRACTS LATCHES AND ACTIVATES AUTO OPERATOR TO OPEN DOORS.
INSIDE ACTUATOR IS ALWAYS ACTIVE TO MOMENTARILY DEENERGIZE MAGNETIC LOCK, RETRACT LATCHES AND ACTIVATE AUTO OPERATOR TO OPEN DOORS.

PR SETX 2H

	EA	HINGES	AS SPECIFIED	MCK
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	QEL-9927-EO-LBR TYPE 2 LBR	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9927-EO-LBR TYPE 2 LBR	VON
1	EA	DELAYED EXIT LOGIC CONTROLLER	DE5300	VON
1	EA	JUNCTION BOX	JB7 W/RELAYS AS REQD	VON
1	EA	ROD AND LATCH GUARD	RGO-	VON
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	MAGNETIC LOCK	M490P	SCE
1	EA	AUTO OPERATOR	DOUBLE EGRESS	STA
2	EA	ACTUATOR	ROUND W/BLUE LOGO	STA
2	EA	KICKPLATE	J102 .050 10" X 1" LDW	IVE
2	EA	WALL STOP	L22251	IVE
1	EA	CARD READER	BY SECURITY SUPPLIER	
1	EA	POWER SUPPLY	PS904 4RL	VON
1	EA	ELEVATION DRAWING		
1	EA	WIRE DIAGRAM	POINT TO POINT	

FUNCTION: DELAYED EGRESS EXIT DEVICE SYSTEM - DEPRESSING PUSHBAR FOR DESIGNATED AMOUNT OF TIME BEGINS IRREVERSIBLE ALARM CYCLE. UPON COMPLETION OF ALARM CYCLE FREE EGRESS IS ALLOWED. DEVICE CAN BE ARMED, RESET OR DISARMED BY KEY OR ACCESS CONTROL. (DELAYED EGRESS RESTRICTIONS PER LOCAL CODE REQUIREMENTS). DELAY 15 SECONDS.
PRESENTATION OF VALID CREDENTIAL MOMENTARILY DEENERGIZES DELAYED EGRESS SYSTEM. UPON LOSS OF POWER, OR ACTIVATION OF FIRE ALARM OR FIRE PROTECTION SYSTEM, DELAY EGRESS SYSTEM IS SHUNTED ALLOWING FREE EGRESS.

FUNCTION: ANSI 01 (EO) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD.

OUTSIDE ACTUATOR IS CONTROLLED BY THE ACCESS CONTROL SYSTEM TO RETRACT LATCHES AND OPEN DOORS WHEN DELAYED EGRESS SYSTEM IS MOMENTARILY DEENERGIZED BY PRESENTATION OF A VALID CREDENTIAL.
INSIDE ACTUATOR IS ALWAYS ACTIVE TO MOMENTARILY SHUNT DELAYED EGRESS SYSTEM OF OPPOSITE LEAF, RETRACT LATCHES AND OPEN DOORS EXCEPT WHEN THE DELAYED EGRESS SYSTEM IS IN THE ALARM CYCLE.

PR SETX 29

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PUSH BUTTON LOCK	L1021	SIM
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	OH STOP	C52541	GLY
1	EA	SURFACE CLOSER	C02011	LCN
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE
1	EA	GASKETING	R0E154	ZER

LOCKSET IS NORMALLY SECURE. INSIDE LEVER ALWAYS ALLOWS FREE EGRESS. VALID TOGGLE CREDENTIALS ON THE EXTERIOR MAY BE USED TO CHANGE TO A PASSAGE OR SECURED STATUS.

PR SETX 27

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PUSH BUTTON LOCK	L1021	SIM
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	SURFACE CLOSER	C02021 (PT4G)	LCN
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE

LOCKSET IS NORMALLY SECURE. INSIDE LEVER ALWAYS ALLOWS FREE EGRESS. VALID TOGGLE CREDENTIALS ON THE EXTERIOR MAY BE USED TO CHANGE TO A PASSAGE OR SECURED STATUS.

PR SETX 25

	EA	HINGES	AS SPECIFIED	MCK
1	EA	MANUAL FLUSH BOLT	FB458	IVE
1	EA	PUSH BUTTON LOCK	L1021	SIM
1	EA	IC CYLINDER	AS REQUIRED	FAL
2	EA	OH STOP & HOLDER	C51541 (WITH HOLD)	GLY
2	EA	ARMORPLATE	J101 .050 34" X 1" LDW	IVE

LOCKSET IS NORMALLY SECURE. INSIDE LEVER ALWAYS ALLOWS FREE EGRESS. VALID TOGGLE CREDENTIALS ON THE EXTERIOR MAY BE USED TO CHANGE TO A PASSAGE OR SECURED STATUS.

PR SETX 25

	EA	HINGES	AS SPECIFIED	MCK
1	EA	PUSH BUTTON LOCK	L1021	SIM
1	EA	IC CYLINDER	AS REQUIRED	FAL
1	EA	WALL STOP	L22251	IVE
1	EA	SURFACE CLOSER	C02011	LCN
1	EA	KICKPLATE	J102 .050 10" X 2" LDW	IVE

LOCKSET IS NORMALLY SECURE. INSIDE LEVER ALWAYS ALLOWS FREE EGRESS. VALID TOGGLE CREDENTIALS ON THE EXTERIOR MAY BE USED TO CHANGE TO A PASSAGE OR SECURED STATUS.

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SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Automatic operators for swinging doors.

1.2 RELATED REQUIREMENTS

A. Door Hardware: Section 08 71 00, DOOR HARDWARE.

B. Access Control Devices: Division 28, ELECTRONIC SAFETY AND SECURITY.

C. Electric General Wiring, Connections and Equipment Requirements: Division 26, ELECTRICAL.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
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.

C. Builders Hardware Manufacturers Association (BHMA):

1. BHMA A156.10-11 - Power Operated Pedestrian Doors.

D. National Fire Protection Association (NFPA):

1. 101-15 - Life Safety Code.

E. Underwriters Laboratories (UL):

1. 325-13 - Standard for Doors, Drapery, Gate, Louver, and Window Operators and Systems.

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.
3. Warranty.

D. Test reports: Certify each product complies with specifications.

E. Qualifications: Substantiate qualifications comply with specifications.

F. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

2. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

1.5 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:
   1. Regularly manufactures specified products.
   2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
      a. Provide contact names and addresses for completed projects when requested by Contracting Officer's Representative.

B. Installer’s Qualifications: Experienced installer, approved by the manufacturer.

1.6 WARRANTY

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

B. Manufacturer's Warranty: Warrant automatic door operators against material and manufacturing defects.
   1. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Comply with requirements of BHMA A156.10. Unless otherwise indicated on Drawings, provide operators that move doors from fully closed to fully opened position in three seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Motors, starters, controls, associated devices, and interconnecting wiring required for installation. Equipment and wiring as specified in Division 26, ELECTRICAL.

2.2 PRODUCTS - GENERAL

A. Provide door operators from one manufacturer.

B. Provide one type of operator throughout project.

2.3 SWING DOOR OPERATORS

A. General:
   1. Type: Institutional type.
   2. Size: As recommended by manufacturer for door weight and sizes.

B. Function:

1. Provide operators, enclosed in housing, permitting opening of door by energizing motor and stopped by electrically reducing Voltage and stalling motor against mechanical stop.
2. Door to close by means of spring energy, and closing force controlled by gear system and motor being used as dynamic brake without power, or controlled by hydraulic closer in electro-hydraulic operators.
3. Opening and Closing Speeds: Field adjustable.
4. Operators with checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
5. Operators capable of recycling doors instantaneously to fully open position from any point in closing cycle when control switch is activated.
6. When automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Connect hardware with drive arm attached to door with pin linkage rotating in a self-lubricating bearing. Prevent doors from pivoting on shaft of operator.

D. Operator Housing:
1. ASTM B209, Type 6063-T5 aluminum alloy, 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high by 3.2 mm (0.125 inch) thick, aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems.

E. Power Operator:
1. Completely assembled and sealed unit including gear drive transmission, mechanical spring and bearings, located in aluminum case and filled with special lubricant for extreme temperature conditions. Rubber mounted units with provisions for easy maintenance and replacement, without removing door from pivots or frame.

F. Motors:
1. Provide with interlock to prevent operation when doors are electrically locked from opening.

G. Electrical Control:
1. Self-contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator.
2. Connecting Harnesses: Interlocking plugs.

H. Accessories:
   1. Metal mounting supports, brackets and other accessories necessary for installation of operators at head of door frames.

I. Microprocessor Controls:
   1. Multi-function microprocessor control providing adjustable hold open time (1-30 seconds) with fully adjustable opening speed, LED indications for sensor input signals and operator status and power assist close options. Control capable of receiving activation signals from any device with normally open dry contact output.
   2. Hold doors held open by low Voltage applied to the continuous duty motor.
   3. Controls:
      a. Adjustable safety circuit that monitors door operation and stops opening direction of door if obstruction is sensed.
      b. Recycle feature that reopens door if obstruction is sensed at any point during closing cycle.
      c. Standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated on drawings.

2.4 POWER UNITS

A. Self-contained, electric operated and independent of door operator.
   1. Capacity and size of power circuits according to automatic door operator manufacturer's specifications and Division 26 - ELECTRICAL.

2.5 DOOR CONTROLS

A. Control Devices: BHMA A156.10; control opening and closing functions.

B. Open doors when control device is actuated; hold doors in open positions; then, close doors after an adjustable time period, unless safety device or reactivated control interrupts operation.

C. Manual Controls:
   1. Push Plate Wall Switch: Recessed type, stainless steel push plate minimum 100 mm by 100 mm (4 inches by 4 inches), with 13 mm (1/2 inch) high letters "To Operate Door-Push" engraved on face of plate.

D. Motion Detector:
   1. Mounting: Surface or concealed.
   2. Detection Area: 1500 mm (60 inches) deep and 1500 mm (60 inches) across, plus or minus 150 mm (6 inches).
   3. Response Time: 25 milliseconds, maximum.

4. Control Power: 24 Volt DC.
5. Design units to be unaffected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

2.6 SAFETY DEVICES

A. Swing Doors: Install presence sensor on pull side of door to detect any person standing in door swing path and prevent door from opening.
   1. Time delay Switches: Adjustable between 3 to 60 seconds and control closing cycle of doors.
B. Install decal signs with "In" or "Do Not Enter" on both faces of each door where shown.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
   1. Verify door opening is correctly sized and within acceptable tolerances.
B. Protect existing construction and completed work from damage.

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. Coordinate door installation with other related work.
C. Install manual controls and power disconnect switches recessed or semi-flush mounted in partitions.
D. Secure operator components to adjacent construction with suitable fastenings.
E. Conceal conduits, piping, and electric equipment, in finish work.
F. Install power units in locations shown.
   1. Where units are mounted on walls, provide metal supports or shelves for units.
   2. Ensure equipment, including time delay switches, are accessible for maintenance and adjustment.
G. Ensure operators are adjusted and function properly for type of expected traffic.
H. Synchronize each leaf of pair doors to open and close simultaneously. Permit each door leaf to be opened manually, independent of other door leaf.

I. Install controls at positions shown and ensuring convenience for expected traffic.

J. Push Plate Wall Switches Mounting Height: 1000 mm (40 inches) maximum, unless otherwise approved by Contracting Officer's Representative.

3.3 DEMONSTRATION AND TRAINING

A. Instruct VA personnel in proper automatic door operator operation and maintenance.

1. Trainer: Manufacturer approved instructor.
2. Training Time: 2 hours minimum.

B. Coordinate instruction to VA personnel with VA Contracting Officer's Representative.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the following:

1. Glass.
2. Glazing materials and accessories for both factory and field glazed assemblies.

1.2 RELATED WORK:

A. Factory glazed by manufacturer in following units:

1. Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS, and Section 08 41 13 Aluminum Framed Entrances.

1.3 LABELS:

A. Temporary labels:

1. Provide temporary label on each light of glass and plastic material identifying manufacturer or brand and glass type, quality and nominal thickness.
2. Label in accordance with NFRC label requirements.
3. Temporary labels are to remain intact until glass is approved by Contracting Officer Representative (COR).

B. Permanent labels:

1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
   a. Tempered glass.
   b. Laminated glass or have certificate for panes without permanent label.
3. Fire rated glazing assemblies: Mark in accordance with IBC.

1.4 PERFORMANCE REQUIREMENTS:

A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is to withstand applied loads, stresses, movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; unsafe engagement of the framing system; deflections beyond specified limits; or other defects in construction.

B. Glazing Unit Design: Design glass, including engineering analysis meeting requirements of authorities having jurisdiction. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.
   1. Design glass in accordance with ASTM E1300, and for conditions beyond the scope of ASTM E1300, by a properly substantiated structural analysis.

1.5 SUBMITTALS:

A. 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. Manufacturer's Certificates:
   1. Certificate stating that fire-protection and fire-resistive glazing units meet code requirements for fire-resistance-rated assembly and applicable safety glazing requirements.

D. Manufacturer Warranty.

E. Manufacturer's Literature and Data:
   1. Glass, each kind required.
   2. Elastic compound for metal sash glazing.
   3. Glazing cushion.
   4. Sealing compound.

F. Samples:
   1. Size: 305 mm by 305 mm (12 inches by 12 inches).

G. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer’s test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.6 DELIVERY, STORAGE AND HANDLING:

A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of glass is required. Do not remove packaging or wrapping except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Treat glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling to comply with manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.

1.7 PROJECT CONDITIONS:

Field Measurements: Field measure openings before ordering tempered glass products to assure for proper fit of field measured products.

1.8 WARRANTY:

A. Construction Warranty: Comply with the FAR clause 52.246-21 “Warranty of Construction”.

B. Manufacturer Warranty: Manufacturer shall warranty their glazing from the date of installation and final acceptance by the Government as follows. Submit manufacturer warranty.

1. Laminated glass units to remain laminated for five (5) years.

1.9 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Architectural Manufacturers Association (AAMA):

800 .....Test Methods for Sealants

810.1-77 .....Expanded Cellular Glazing Tape

C. American National Standards Institute (ANSI):

Z97.1-14 .....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test

D. ASTM International (ASTM):

C542-05(R2011) .....Lock-Strip Gaskets

C716-06 .....Installing Lock-Strip Gaskets and Infill Glazing Materials
C794-10 .....Adhesion-in-Peel of Elastomeric Joint Sealants
C864-05(R2011) .....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
C920-14a .....Elastomeric Joint Sealants
C964-07(R2012) .....Standard Guide for Lock-Strip Gasket Glazing
C1036-11(R2012) .....Flat Glass
C1048-12 .....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
C1172-14 .....Laminated Architectural Flat Glass
C1376-10 .....Pyrolytic and Vacuum Deposition Coatings on Flat Glass
E84-14 .....Surface Burning Characteristics of Building Materials
E119-14 .....Standard Test Methods for Fire Test of Building Construction and Material
E1300-12a .....Load Resistance of Glass in Buildings

E. Code of Federal Regulations (CFR):
16 CFR 1201-10 .....Safety Standard for Architectural Glazing Materials

F. Glass Association of North America (GANA):
2010 Edition .....GANA Glazing Manual
2008 Edition .....GANA Sealant Manual
2009 Edition .....GANA Laminated Glazing Reference Manual

G. International Code Council (ICC):
IBC .....International Building Code

H. Intertek Testing Services – Warnock Hersey (ITS-WHI)

I. National Fire Protection Association (NFPA):
80-16 .....Fire Doors and Windows
252-12 .....Fire Tests of Door Assemblies
257-12 .....Standard on Fire Test for Window and Glass Block Assemblies

J. National Fenestration Rating Council (NFRC)

K. Underwriters Laboratories, Inc. (UL):
9-08(R2009) .....Fire Tests of Window Assemblies
263-14 .....Fire Tests of Building Construction and Materials

L. Unified Facilities Criteria (UFC):

4-010-01-03(R2007) .....DOD Minimum Antiterrorism Standards for Buildings

M. U.S. Veterans Administration:

Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety Protected

Physical Security Design Manual for VA Facilities (VAPSDG); Mission Critical Facilities

Architectural Design Manual for VA Facilities (VASDM)

N. Environmental Protection Agency (EPA):

40 CFR 59(2014) .....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCT

2.1 GLASS:

A. Provide minimum thickness stated and as additionally required to meet performance requirements.

1. Provide minimum 6 mm (1/4 inch) thick glass units unless otherwise indicated.

B. Obtain glass units from single source from single manufacturer for each glass type.

C. Clear Glass:

1. ASTM C1036, Type I, Class 1, Quality q3.

2.2 TEMPERED GLASS:

A. Roller Wave Limits for Heat-Treated Glass: Orient all roller wave distortion parallel to bottom surface of glazing, and provide units complying with the following limitations:

1. Measurement Parallel to Line: Maximum peak to valley 0.203 mm (0.008 inch).
2. Measurement Perpendicular to Line: Maximum 0.0254 mm (0.001 inch).
3. Bow/Warp: Maximum 50 percent of bow and warp allowed by ASTM C1048.

B. Clear Heat Strengthened Glass:

1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.

2.3 LAMINATED GLASS:

A. Laminated Glass: ASTM C1172. Two or more lites of glass bonded with polyvinyl butyral, ionomeric polymer, or cast-in-place and cured-transparent-resin interlayer complying with interlayer manufacturer's written instructions.

B. Interlayer: Use min. 0.75 mm (0.030 inch) thick interlayer for vertical glazing unless otherwise noted.

C. Interlayer: Use 1.5 mm (0.060 inch) thick interlayer for:

1. Acoustical glazing. ICU sliding doors.
2. Assemblies requiring heat strengthened or fully tempered glass.

D. Interlayer Color: Clear.

2.4 FIRE PROTECTION AND FIRE RESISTANCE GLAZING:

A. Fire-Protection-Rated Glazing: Glazing units tested for use in fire door assemblies or fire windows, UL, ITS-WHI or equivalent listed and labeled by testing agency in accordance with IBC, for fire-protection ratings as indicated on construction documents, based upon positive-pressure testing per NFPA 257 or UL 9, and complying with NFPA 80.

1. Hose-Stream Test: Units must comply, except units having fire-protection rating of 20 minutes.
2. Temperature Rise Limitation: Units over 0.065 sq. m (100 sq. in.) must comply with 232 deg. C (450 deg. F) limitation.
3. Labeling: Permanently label fire-protection-rated glazing units in accordance with IBC.
4. Safety Glazing: Comply with 16 CFR 1201, Category II.
5. Fire-Protection-Rated Tempered Glass: For 20-minute fire-protection-rated door assemblies, of thickness scheduled.
6. Fire-Protection-Rated Laminated Ceramic Glazing: Units made from two lites of clear, ceramic glass, 8 mm (5/16 inch) total thickness, for rating scheduled.
7. Fire-Protection-Rated Laminated Glass with Intumescent Interlayers: Units made from multiple lites of uncoated, ultra-clear (low-iron) float glass, in intumescent interlayers, of thickness and rating scheduled.

2.5 GLAZING ACCESSORIES:

A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work are to have a finish that will not corrode or stain while in service. Fire rated glazing to be installed with glazing accessories in accordance with the manufacturer’s installation instructions.

B. Setting Blocks: ASTM C864:

1. Silicone type.
2. Channel shape; having 6 mm (1/4 inch) internal depth.

3. Shore A hardness of 80 to 90 Durometer.
4. Block lengths: 50 mm (2 inches).
5. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
6. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:
1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: 25 to 76 mm (1 to 3 inches).
4. Shore A hardness of 40 to 50 Durometer.

D. Glazing Tapes:
1. Semi-solid polymeric based closed cell material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbeted sash without stops.

H. Glazing Gaskets: ASTM C864:
1. Firm dense wedge shape for locking in sash.
2. Soft, closed cell with locking key for sash key.
3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

I. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

J. Glazing Sealants: ASTM C920, silicone neutral cure:
1. Type S.
2. Class 25 or 50 as recommended by manufacturer for application.
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.
5. VOC Content: For sealants used inside the weatherproofing system, not more than 250 g/L or less when calculating according to 40 CFR 59, (EPA Method 24).

K. Structural Sealant: ASTM C920, silicone acetoxy cure:
1. Type S.
2. Class 25.

3. Grade NS.
4. Shore a hardness of 25 to 30 Durometer.

L. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.
1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
2. Designed for dry glazing.

M. Color:
1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames to match color of the finished aluminum and be non-staining.
2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted are to be black, gray, or neutral color.

N. Smoke Removal Unit Targets: Adhesive targets affixed to glass to identify glass units intended for removal for smoke control. Comply with requirements of local Fire Department.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verification of Conditions:
1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer is approved shop drawings.

B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units.

3.2 PREPARATION:

A. For sealant glazing, prepare glazing surfaces in accordance with GANA Sealant Manual.

B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

C. Shop-fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

D. Verify that components used are compatible.

E. Clean and dry glazing surfaces.

F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION – GENERAL:

A. Install in accordance with GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, and IGMA TM-3000 unless specified otherwise.

B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

C. Set glazing without bending, twisting, or forcing of units.

D. Do not allow glass to rest on or contact any framing member.

E. Glaze doors in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

G. Laminated Glass:

1. Tape edges to seal interlayer and protect from glazing sealants.
2. Do not use putty or glazing compounds.

H. Fire Protective and Fire Resistance Glass:

1. Wire Glass: Glaze in accordance with NFPA 80.
2. Other fire protective and fire-resistant glass: glaze in accordance with manufacturer’s installation instructions and NFPA 80.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING):

A. Cut glazing tape or spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Trim protruding tape edge.

3.5 REPLACEMENT AND CLEANING:

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.

B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.

C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.6 PROTECTION:

A. Protect finished surfaces from damage during erection, and after completion of work.

3.7 LAMINATED GLASS SCHEDULE:

A. Glass Type LG1: Clear laminated glass with two (2) lites of heat-strengthened, fully tempered glass.

1. Unit Thickness: 6 mm (0.23 inch.
2. Minimum Thickness of Each Glass Lite: 3 mm (0.12 inch).
3. Interlayer Thickness: 0.76 mm (0.030 inch).
4. Safety glazing label required.

3.8 FIRE-PROTECTIVE AND FIRE-RESISTANCE GLAZING SCHEDULE:

A. Glass Type FR1: Fire-resistance-rated glazing units.

1. Thickness: As required.
2. Rating: 45-minute.
3. Application: Fire-resistance-rated door assemblies.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies subsurface preparation requirements for areas to receive the installation of applied and resinous flooring. This section includes removal of existing floor coverings, testing concrete for moisture and pH, remedial floor coating for concrete floor slabs having unsatisfactory moisture or pH conditions, floor leveling and repair as required.

1.2 RELATED WORK

A. Section 07 92 00, JOINT SEALANTS.

B. Section 09 65 16, RESILIENT SHEET FLOORING
Section 09 65 19, RESILIENT TILE FLOORING
Section 09 67 23.20, RESINOUS (EPOXY BASE) WITH DECORATIVE QUARTZ DOUBLE BROADCAST
Section 09 68 00, CARPETING

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.

B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer

C. Product Data:
1. Moisture remediation system
2. Underlayment Primer
3. Cementitious Self-Leveling Underlayment
4. Cementitious Trowel-Applied Underlayment

D. Test Data:
1. Moisture test and pH results performed by a qualified independent testing agency or warranty holding manufacturer’s technical representative.

1.4 DELIVERY AND STORAGE

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.

B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

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

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

D638-*10* *(2010)*	Test Method for Tensile Properties of Plastics
D4259-*88* *(2012)*	Standard Practice for Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.
C109/C109M *-12* *(2012)*	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) Modified Air Cure Only
D7234-*12* *(2012)*	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
E96/E96M - 12 ***(2012)***	Standard Test Methods for Water Vapor Transmission of Materials
F710-*11* *(2011)*	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
F1869-*11* ***(2011)***	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-*11* ***(2011)***	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C348-08 ***(2008)***	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C191-13 ***(2013)***	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle

PART 2 - PRODUCTS

2.1 MOISTURE REMEDIATION COATING

A. System Descriptions:

1. High-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment. For use under resinous products, VCT, tile and carpet where issues caused by moisture vapor are a concern.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers and installation method. Verify

compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Liquid applied coating:
   a. Resin: epoxy.
   b. Formulation Description: Multiple component high solids.
   c. Application: Per manufacturer's written installation requirements.
   d. Thickness: minimum 10 mils

D. Material Vapor Permeance: Application shall achieve a permeance rating of less than 0.1 perm in accordance with ASTM E96/E96M.

E. Maximum RH requirement: 100% testing in accordance with ASTM F2170.

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	SCAMD Rule 1113	25 grams per liter
Permeance	ASTM E96	0.1 perms
Tensile Modulus	ASTM D638	$1.9X10^5$psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufacture's Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% bond to concrete failure

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

A. System Descriptions:

1. High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.

C. System Characteristics:

1. Wearing Surface: smooth
2. Thickness: Per architectural drawings, ranging from feathered edge to 1", per application. Applications greater than 1" require additional 3/8" aggregate to mix or as recommended by manufacturer.

D. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

E. Compressive Strength: Minimum 4100 psi in 28 days in accordance with ASTM C109/C109M.

F. Flexural Strength: Minimum 1000 psi in 28 days in accordance with ASTM C348

G. Dry Time: Underlayment shall receive the application of moisture insensitive tile in 6 hours, floor coverings in 16 hours, and resinous flooring in 3-7 days.

H. Primer: compatible and as recommended by manufacturer for use over intended substrate.

I. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Primer:
   a. Resin: copolymer
   b. Formulation Description: single component ready to use.
   c. Application Method: Squeegee and medium nap roller.
      All puddles shall be removed, and material shall be allowed to dry, 1-2 hours at 70F/21C.
   d. Number of Coats: (1) one.
2. Grout Resurfacing Base:
   a. Formulation Description: Single component, cementitious self-leveling high-early and high-ultimate strength grout.
   b. Application Method: colloidal mix pump, cam rake, spike roll.
      1) Thickness of Coats: Per architectural scope, 1” lifts.
      2) Number of Coats: More than one if needed.
   c. Aggregates: For applications greater than 1inch, require additional 3/8” aggregate to mix.

Property	Test	Value
Compressive Strength	ASTM C109/C109M	2,200 psi @ 24 hrs 3,000 psi @ 7 days
Initial set time Final Set time	ASTM C191	30-45 min. 1 to 1.5 hours
Bond Strength	ASTM D7234	100% bond to concrete failure

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.

C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/16-30 degrees C.

3.2 SURFACE PREPARATION

A. Existing concrete slabs with existing floor coverings:

1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.

B. Concrete shall meet the requirements of ASTM F710 and be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.

C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.

D. Prepare concrete substrates per ASTM D4259 as follows:

1. Dry abrasive blasting.
2. Wet abrasive blasting.
3. Vacuum-assisted abrasive blasting.
4. Centrifugal-shot abrasive blasting.
5. Comply with manufacturer's written instructions.

E. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.

F. Verify that concrete substrates are dry.

G. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of per flooring manufactures formal and project specific written recommendation.

H. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity per flooring manufacture's formal and project specific written recommendation.

I. Provide a written report showing test placement and results.

J. Prepare joints in accordance with Section 07 92 00, JOINT SEALANTS and material manufacturer's instructions.

K. Alkalinity: Measure surface pH in accordance with procedures provided in ASTM F710 or as outlined by qualified testing agency or flooring manufacturer's technical representative.

L. Tolerances: Subsurface shall meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer. Tolerance shall also not exceed 1/4" deviation in 10'. As required, install underlayment to achieve required tolerance.

M. Other Subsurface: For all other subsurface conditions, such as wood or metal, contact the floor finish or underlayment manufacturer, as appropriate, for proper preparation practices.

3.3 MOISTURE REMEDIATION COATING:

A. Where results of relative humidity testing (ASTM F2170) exceed the requirements of the specified flooring manufacturer, apply remedial coating as specified to correct excessive moisture condition.

B. Prior to remedial floor coating installation mechanically prepare the concrete surface to provide a concrete surface profile in accordance with ASTM D4259.

C. Mix and apply moisture remediation coating in accordance with manufacturer's instructions.

3.4 CEMENTITOUS UNDERLAYMENT:

A. Install cementitious self-leveling underlayment as required to correct surface defects, floor flatness or levelness corrections to meet the tolerance requirements as or detailed on drawings, address non-moving cracks or joints, provide a smooth surface for the installation of floor covering, or meet elevation requirements detailed on drawings.

B. Mix and apply in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, tempered hardwood, or other suitable protection course

3.6 FIELD QUALITY CONTROL

A. Where specified, field sampling of products shall be conducted by a qualified, independent testing facility.

- - - E N D - - -

SECTION 09 06 00
SCHEDULE FOR FINISHES

SECTION 09 06 00-SCHEDULE FOR FINISHES

VAMC: SIOUX FALLS VA MEDICAL CENTER
Location: SIOUX FALLS, SOUTH DAKOTA
Project No. and Name: 438-19-101 RENOVATE PREOPERATIVE CARE UNIT
Submission: BID SET
Date: 11/06/2020

SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I – GENERAL

1.1 DESCRIPTION

A. This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

A. Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 APPLICABLE PUBLICATIONS

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

B. MASTER PAINTING INSTITUTE: (MPI)

2001 .....Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1 DIVISION 05 – METALS

A. SECTION 05 12 00, STRUCTURAL STEEL FRAMING

Component	Finish	Color
Steel Lintels	Galvanized	N/A
Steel Shapes, Plates, Bars	Plain	N/A
Pipe	Plain	N/A

Bolts, Nuts, Washers	Plain	N/A

2.2 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

A. SECTION 06 20 00, FINISH CARPENTRY

1. SHELVES AND RODS

Component	Material	Manufacturer/Color/No.
Combination Garment Rod and Shelf Support	Steel	Enamel/White
Shelf	Plastic Laminate/PL-1	Wilsonart/Nickel EV/#4813-60
Rod	Steel	Chrome Plating

2. ACRYLIC SOLID SURFACE

Code	Application	Manufacturer	Color/No.
S-1	Counters and Wall Caps	LG HI-MACS	Milky Way/#T009

3. PLASTIC RESIN DECORATIVE PANEL

Code	Manufacturer	Product	Thickness	Interlayer/Color/Finish
EP-1	3Form	Varia Ecoresin	1/2” (12.7mm)	Strand/Iron

2.3 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. SECTION 07 92 00, JOINT SEALANTS

Location	Color	Manufacturer	Manufacturer Color

At Concrete	Match Concrete	N/A	N/A
At Masonry	Match Mortar Joints	N/A	N/A
At Other Locations	Light Gray or Aluminum	N/A	N/A

2.4 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Paint Code
Frame	Paint P-4

B. SECTION 08 14 00, WOOD DOORS

Component	Manufacturer/Product & No.	Finish/Color/No.
Swing Doors	CS Acrovyn/Impact Resistant Door #SCL5-NR	Fossil Teak/#1352
Sliding Doors	AD Systems/ExamSlide	CS Acrovyn/Fossil Teak/#1352

C. SECTION 08 31 13, ACCESS DOORS AND FRAMES

Material	Finish/Color
Steel	Match Existing
Stainless steel	Match Existing

2.5 DIVISION 09 - FINISHES (SEE FINISH FLOOR PLAN AND ROOM FINISH SCHEDULE)

A. SECTION 09 30 13, PORCELAIN TILING

1. THROUGH-BODY PORCELAIN TILE

Finish Code	Application	Size	Manufacturer	Product Name/Color /No.
PT-1	Floors	12” x 24” Field Tile 6” x 12” Cove Base	Daltile	Portfolio/Ash Grey/#PF05
PT-2	Walls	12” x 24”	Daltile	Fabrique/Crème Linen/#P686

2. GLASS AND METAL MOSAIC TILE WALL ACCENT

Finish Code	Size	Pattern	Manufacturer	Product Name/Color/No.
PT-3	3/8” x 4” Mosaics Mesh-Mounted on 12”x12” Sheet	Stacked Linear	Daltile	Lucent Skies/Crimson Dusk/#LS12

3. GROUT

Tile	Manufacturer	Product Name/Color/No.
PT-1	Bostik	TruColor RapidCure/Delorean Gray/#H160
PT-2 & PT-3	Bostik	TruColor RapidCure/Mobe Pearl/#H145

4. METAL DIVIDER STRIPS

Size	Material	Manufacturer	Product Name/Finish/No.
1/8” Wide Top; Height as Req’d	Stainless Steel	Schluter	SCHIENE/Brushed/EB

B. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color	Manufacturer	Product Name/No.
N/A	Exposed Suspension System	White		
AT-1	Type III	White	Armstrong	Cortega 15/16" Angled Tegular/#704
AT-2	Type IV	White	Armstrong	Clean Room VL/ Unperforated/868

C. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	ProductName & No./Color/No.
LVT-1	6" x 48"	LVT	Philadelphia Commercial	In the Grain II 30 5536V/Flaxseed/#00568
LVT-2	12" x 24"	LVT	Tandus Centiva by Tarkett	ID Latitude Stone PLST 7214 QU/Luna/#7214

D. SECTION 09 65 16, RESILIENT SHEET FLOORING, HEAT WELDED SEAMS (WSF)

Finish Code	Manufacturer	Pattern	Color/No.
WSF-1	Mannington Commercial	BioSpec MD	Ecru/#15362
WSF-2	Mannington Commercial	BioSpec MD	Blue Ridge/#15376

1. SECTION 09 65 16, WELDING RODS (WSF)

Finish code	Manufacturer	Color
N/A	Mannington Commercial	Manufacturer's standard to match WSF-1

E. SECTION 09 65 13, RESILIENT BASE

Finish Code	Item	Height	Manufacturer	Color /No.
RB-1	Resilient Base (RB)	4"	Johnsonite	Pebble/#32

F. SECTION 09 67 23.20 RESINOUS (EPOXY BASE) WITH DECORATIVE QUARTZ DOUBLE BROADCAST

Manufacturer	Product	Color /No.
Tennant Coatings	Quartz DB Double Broadcast System: Seed Coat: Eco-MPE Broadcast: Decorative Quartz Sealer: Eco-URE Topcoat: Eco-HTS 100 Waterproofing Membrane: Eco-Flex Self-Leveling Mortar: Eco-Crete SL Mortar for floor slope: ReVue-CRM Joint Sealant at Flooring Termination and Joint Isolation: Eco-EJF	To be selected from Manufacturer's standard colors

1. BASE CAP STRIP

Material	Finish
Aluminum	Clear anodic coating, chemically etched medium matte

G. SECTION 09 68 00, CARPET (CPT)

Finish Code	Pattern	Manufacturer	Color/No.
CPT-1	Straight Shift 54810	Philadelphia Commercial	Screw/#00505

1. CARPET EDGE STRIP

Material	Manufacturer	Color/No.
Vinyl	Johnsonite	Pebble/#32

H. SECTION 09 72 16, VINYL COATED FABRIC WALLCOVERING (W)

Finish Code	Manufacturer	Product Name/Color/No.
VWC-1	Tower by J Josephson	Mingle/Beachside/#T2-MN-05
VWC-2	Tower by J Josephson	Golden Grain/Silver Birch/#T2-GG-11

I. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

		Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and	max 10 units
Gloss Level 2	a high side sheen flat - "a velvet-like" finish	max 10 units, and	10-35 units
Gloss Level 3	a traditional "egg-shell like" finish	10-25 units, and	10-35 units
Gloss Level 4	a "satin-like" finish	20-35 units, and	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	
Gloss Level 6	a traditional gloss	70-85 units	
Gloss level 7	a high gloss	more than 85 units	

2. PAINT

Paint code	MPI	Gloss	Manufacturer	Product	Color/No.
P-1	MPI 141	Gloss Level 5	Benjamin Moore	Ultra Spec SCUFF-X	Match Diamond Vogel Hidden Cove/#0210
P-2	MPI 147	Gloss Level 4	Diamond Vogel	Zero Plus Interior Zero VOC Latex	Hidden Cove/#0210
P-3	MPI 147	Gloss Level 5	Diamond Vogel	Zero Plus Interior Zero VOC Latex	Thistle Gray/#0197
P-4	MPI 153	Gloss Level 5	Sherwin Williams	Pro Industrial	Match Diamond Vogel

				Acrylic	Drifting Sand/#0218
P-5 (Not Used)			Zolatone	Lluminations	ZFX-5112
P-6	MPI 147	Gloss Level 5	Diamond Vogel	Zero Plus Interior Zero VOC Latex	In the Blue/#0504
P-7	MPI 147	Gloss Level 5	Diamond Vogel	Zero Plus Interior Zero VOC Latex	Always Neutral/#0559

2.6 DIVISION 10 - SPECIALTIES

A. SECTION 10 21 23, HOSPITAL CUBICLE CURTAIN TRACKS

Finish Code	Manufacturer	Product Name/Color
Track	Clickeze by InPro Corporation	Whisper Cube/White

B. SECTION 10 21 23.13, CUBICLE CURTAINS

Finish Code	Manufacturer	Product Name/Color
Privacy Curtain/PC-1	Phoenix Textile	Fabric: Respite/Vessel; Mesh: White

C. SECTION 10 22 26.13, ACCORDION FOLDING PARTITION (AFP)

Component/Code	Material	Manufacturer	Mfg. Color Name/No.
1. Panels/AD-1	Vinyl	Modernfold	Koroseal/Lineage/Heritage/#9521-29
2. Trim/AD-2	Paint	Modernfold	Dark Bronze

D. SECTION 10 26 00, WALL PROTECTION

Item/Code	Product Name/No.	Manufacturer	Color/No./Texture
Corner Guards/AG-1	135° Stainless Steel Corner Guard/#CG-60	Pawling	Stainless Steel/#4 Satin
Corner Guards/CG-1	90° Stainless Steel Corner Guard/#CG-51	Pawling	Stainless Steel/#4 Satin
End Wall Guard/EG-1	Stainless Steel Flush Mount End Wall Protector	Inpro Corporation	Stainless Steel/#4 Satin

Wall Guards/Handrail Combo/HR-1	Handrail/#3510VV	Inpro Corporation	Top and Bottom Color: Barrel Oak/#5E048 Top Return: Stainless Steel Bottom Return: French Roast/#0370 Texture: Velvet
Crash Guard/CR-1	NuTree Wall Guard/#NT-140	Inpro Corporation	Weather Wood/#05
High Impact Wall Covering/HIWC-1	CS Acrovyn/#4000	Construction Specialties	Chameleon Simulated Wood: Fossil Teak/#1352 Texture: Suede
Trim for HIWC-1	CS Acrovyn Outside Corner/#WCOS-AF	Construction Specialties	Clear Anodized Aluminum
Rigid Sheet Wall Protection/RWP-1	Palladium Rigid Vinyl Sheet/#406	Inpro Corporation	Slate/#0237 Texture: Velvet
Horizontal Top Cap Board	Palladium 3D Trim/#P-3DHTC2	Inpro Corporation	Brushed Nickel/#5E026
Fiberglass Reinforced Plastic (FRP) Sanitary Wall Covering	Standard FRP	Marlite	Pebble Finish/Color to be selected from Manufacturer's Standard

E. SECTION 10 25 13, PATIENT BED SERVICE WALLS

Component	Manufacturer	Material	Color
Device Mounting Panel	Carolina	Thermofoil Laminate (TFL) on MDF	Pecan/#PC2

F. SECTION 10 51 13, METAL LOCKERS AND ACCESSORIES

Component	Manufacturer	Material	Finish
Lockers	Lyon, Tennsco or Edsal	Steel	Baked enamel Color to be selected from Manufacturer's Standard
Bench Top	ASI Storage	Laminated Maple	Two (2) coats clear finish

Pedestal	ASI Storage	Steel	Baked enamel Color to be selected from Manufacturer's Standard

2.7 DIVISION 12 - FURNISHINGS

A. SECTION 12 11 13, EDGE-ILLUMINATED PHOTO MURALS

Component	Material	Finish/Color
Window Frame and Sashes	Primed Poplar	Field Painted: P-4/Sherwin Williams/Match Diamond Vogel Drifting Sand/#0218
Hardware	Nickel	Satin

A. SECTION 12 31 00, MANUFACTURED METAL CASEWORK

Component	Material and Finish	Manufacturer
Cabinet/Frame/ Doors	Stainless Steel Type 304/Finish No. 4	Mott Manufacturing

B. SECTION 12 35 70, HEALTHCARE CASEWORK

Component	Material and Finish	Manufacturer/Style	Color/No.
Cabinet/Frame	Powder-Coated Steel with 7 Mil High-Performance Finish	Midmark/Synthesis	Exterior: Timber/#801 Interior: Frost/#791
Doors/Drawers	MDF with 12 Mil Seamless Polymer-Covered Front and Melamine Back	Midmark/Serenity	Front: Timber/#801 Back: Frost/#791
Adjustable Shelf	Steel with Premium Powder-Coat, Baked-On Epoxy	Midmark/Synthesis	Frost/#791
Hardware	Metal	Midmark/Flare	N/A
Countertops/PL-1	Plastic Laminate on Particle Board	Wilsonart	Nickel EV/#4813-60

Countertops/S-1	Acrylic Solid Surface on MDF	LG HI-MACS	Milky Way/T009
Filler Panels	MDF with 12mm seamless polymer	Midmark/Synthesis	Timber/#801

PART III EXECUTION

3.1 ROOM FINISH SCHEDULE

A. See drawing sheet AF-101.

--- E N D---

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel stud wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

A. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

B. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS; Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. 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.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM)

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
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

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of 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. Studs 3600 mm (12 feet) or less in length shall be in one piece.

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. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

C. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

D. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

E. Attachments for Wall Furring:

1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.

F. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

C. All corridor walls (new and existing) are to extend to deck above. Field survey retained existing corridor walls and existing walls becoming corridor wall; extend any found not extending to deck above.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Install stud vertically, space studs not more than 400 mm (16 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. 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.

F. 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.

G. 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).

H. Form expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of expansion joint.

I. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 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, 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.

3.4 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 600 mm (24-inch) centers for gypsum board anchorage.

B. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

C. 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 overhead 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.

3.5 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch.)

C. Level or align ceilings within 3 mm (1/8-inch.)

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical fire rated assembly and column fireproofing, indicating details of construction.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

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

C11-15 .....Terminology Relating to Gypsum and Related Building Materials and Systems

C473-19 .....Physical Testing of Gypsum Panel Products
C475-15 .....Joint Compound and Joint Tape for Finishing Gypsum Board
C840-13 .....Application and Finishing of Gypsum Board
C919-12 .....Sealants in Acoustical Applications
C954-15 .....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness
C1002-14 .....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
C1658-13 .....Glass Mat Gypsum Panels
C1396-14 .....Gypsum Board
D3273-16 .....Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
E96-16 .....Water Vapor Transmission of Materials
G21-15 .....Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories Inc. (UL):
Latest Edition .....Fire Resistance Directory

D. Inchcape Testing Services (ITS):
Latest Editions .....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise.

B. Water Resistant Gypsum Backing Board: ASTM C473, ASTM D3273, ASTM E96, ASTM G21, Type X, 16 mm (5/8 inch) thick.

C. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.3 FASTENERS

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

A. Extend all layers of gypsum board from floor to underside of structure overhead Field survey retained existing corridor walls and existing walls becoming corridor walls; extend all layers of gypsum board found not extending to underside of structure overhead.

3.2 INSTALLING GYPSUM BOARD

A. Coordinate installation of gypsum board with other trades and related work.

B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.

C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.

D. Use gypsum boards in maximum practical lengths to minimize number of end joints.

E. Bring gypsum board into contact, but do not force into place.

F. Ceilings:

1. For single-ply construction, use perpendicular application.

G. Walls (Except Shaft Walls):

1. Install gypsum board with 1/2" to 5/8” gap between gypsum board bottom and floor.
2. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.

3. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
4. Stagger screws on abutting edges or ends.
5. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
6. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply application requirements.
8. Control Joints ASTM C840 and as follows:
   a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
   b. Not required for wall lengths less than 9000 mm (30 feet).
   c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. Electrical and Telecommunications Boxes:
1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

I. Accessories:
1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
   a. Install at all vertical and horizontal external corners and where shown.
   b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
   a. At both sides of expansion and control joints unless shown otherwise.

3.3 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas. Provide Level 2 finish at concealed areas above ceilings.

B. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.
2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the construction. Sanding is not required of Level 2 finish surfaces.

3.4 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in Level 2 finish surfaces.

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SECTION 09 30 13
PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies interior porcelain and mosaic tile, waterproofing membranes for thin-set applications, and tile backer board.

1.2 RELATED WORK:

A. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.

B. Color, Texture, Pattern, and Size of Field Tile and Trim Shapes, and Color of Grout Specified: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Metal and Resilient Edge Strips at Joints with New Resilient Flooring, and Carpeting: Section 09 65 19, RESILIENT TILE FLOORING and Section 09 68 00, CARPETING.

1.3 SUBMITTALS:

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

B. Samples:

1. Base tile, each type, each color, each size.
2. Porcelain tile, each type, color, patterns and size.
3. Wall (or wainscot) tile, each color, size and pattern.
4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.

C. Product Data:

1. Porcelain and glass/metal mosaic tile, marked to show each type, size, and shape required.
2. Urethane grout.
3. Cementitious backer unit.
4. Dry-set portland cement mortar.
5. Divider strip.
6. Bonded Elastomeric waterproofing membrane.
7. Reinforcing tape.
8. Leveling compound.
9. Latex-portland cement mortar.
10. Waterproofing isolation membrane.
11. Fasteners.

1.4 DELIVERY AND STORAGE:

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.

B. Store material to prevent damage or contamination.

1.5 QUALITY ASSURANCE:

A. Installers to be from a company specializing in performing installation of products specified and have a minimum of three (3) years' experience.

B. Each type and color of tile to be provided from a single source.

C. Each type and color of mortar, adhesive, and grout to be provided from the same source.

1.6 WARRANTY:

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

1.7 APPLICABLE PUBLICATIONS:

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

B. American National Standards Institute (ANSI):

A10.20-06(R2011) .....Safe Operating Practices for Tile, Terrazzo and Marble WorkA108/A118/A136-14 Installation of Ceramic Tile

A108.01-13 .....Subsurfaces and Preparations by Other Trades

A108.02-13 .....Materials, Environmental, and Workmanship

A108.1B-10 .....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar

A108.5-19 .....Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar

A108.10-10 .....Grout in Tilework

A108.13-10 .....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone

A118.1-12 .....Dry-Set Portland Cement Mortar

A118.4-12 .....Latex-Portland Cement Mortar

A118.6-10 .....Cement Grouts for Tile Installation

A118.7-10 .....High Performance Cement Grouts for Tile Installation

A118.9-10 .....Cementitious Backer Units

A118.10-14 .....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation

A137.1-12 .....American National Standard Specifications for Ceramic Tile

C. ASTM International (ASTM):

A666-10 .....Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate and Flat Bar

A1064/A1064M-14 .....Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

C109/C109M-13 .....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)

C348-14 .....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars

C627-10 .....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

C954-11 .....Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness

C1002-14 .....Steel Self-Piercing Tapping Screws for the Application of Panel Products

C1127-01(R2009) .....Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface

D1204-14 .....Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature

D2240-05(R2010) .....Test Method for Rubber Property – Durometer Hardness

D4068-17 .....Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane

D. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

E. Tile Council of North America, Inc. (TCNA):
Handbook for Ceramic Tile Installation (2019)
DCOF AcuTest-2012 ......Dynamic Coefficient of Friction Test

PART 2 - PRODUCTS

2.1 PRODUCTS – GENERAL:

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINSIHES.

2.2 TILE:

A. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
2. Abrasion Resistance Classification:
a. Tested in accordance with values listed in Table 1, ASTM C1027.
c. Class IV, 6000 revolutions for remaining areas.
3. Slip Resistance for Floors:
a. Coefficient of friction, when tested in accordance with ANSI A137.1 and measured per the TCNA DCOF AcuTest.
1) Equal to or greater than .42 for level interior tile floors that will be walked on when wet.
4. Mosaic tile may be mesh-mounted.
5. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one (1) package show the same range in colors as those taken from other packages and match approved samples.
6. Factory-Applied Temporary Protective Coating:
a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of hot applied petroleum paraffin wax.
b. Do not coat unexposed tile surfaces.
c. Pre-wax tiles set or grouted with latex modified mortars.

B. Through-Body Porcelain Floor Tile (PT-1): Nominal 9.5 mm (3/8 inch).

C. Through-Body Porcelain Wall Tile (PT-2): Nominal 9.5 mm (3/8 inch).

D. Glass and Metal Mosaic Wall Tile Accent (PT-3): Nominal 8 mm (5/16 inch) thick.

E. Trim Shapes:
1. Conform to applicable requirements of adjoining floor and wall tile.
2. Use trim shapes sizes conforming to size of adjoining field wall tile.
4. Internal and External Corners:

a. Square internal and external corner joints are not acceptable.
b. External corners including edges: Use bullnose shapes.
c. Internal corners: Use cove shapes.
d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
h. For wall tile, use cove and bullnose shapes as applicable. When wall and base tile is required, use C Series cove and bullnose shapes.
i. For wall tile installed in dry-set portland cement mortar and latex-portland cement mortar(thin set methods), use cove and surface bullnose shapes as applicable.

2.3 BACKER UNITS:

A. Cementitious Backer Units:
1. Use in showers or wet areas.
2. Conform to ASTM C1325; Type A.
3. Use in maximum lengths available to minimize end to end butt joints.

2.4 JOINT MATERIALS FOR CEMENTITIOUS BACKER UNITS:

A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 50 mm (2 inches) wide. Tape with pressure sensitive adhesive backing will not be permitted.
B. Tape Embedding Material: Latex-portland cement mortar complying with ANSI A108.01.
C. Joint material, including reinforcing tape, and tape embedding material, are to be as specifically recommended by the backer unit manufacturer.

2.5 FASTENERS:

A. Screws for Cementitious Backer Units.
1. Standard screws for gypsum board are not acceptable.
2. Minimum 11 mm (7/16 inch) diameter head, corrosion resistant coated, with washers.
3. ASTM C954 for steel 1 mm (0.033 inch) thick.
4. ASTM C1002 for steel framing less than 0.0329 inch thick.

B. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.

2.6 SETTING MATERIALS OR BOND COATS:

A. Conform to TCNA Handbook for Ceramic Tile Installation.

B. Portland Cement Mortar: ANSI A108.02.

C. Latex-Portland Cement Mortar: ANSI A118.4.

1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.
2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

D. Dry-Set Portland Cement Mortar: ANSI A118.1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.1.

E. Bonded Elastomeric Waterproofing Membrane: (Rooms without Showers)

1. ANSI A118.10.
2. One component polyurethane, liquid applied material having the following additional physical properties:
   a. Hardness: Shore "A" between 40-60.
   b. Elongation: Between 300-600 percent.
   c. Tensile strength: Between .27 - .41 Newton per square millimeter (40-60 pounds per square inch gauge).
   d. No volatile compounds (VOC).
3. Coal tar modified urethanes are not acceptable.

F. Bonded Waterproofing Membrane: (Patient Toilet Rooms with Showers)

1. Composite sheet consisting of ASTM D4068 Chlorinated Polyethylene (CM) sheet reinforced on both sides with a non-woven polyester fiber.
2. Conform to the following additional physical properties:

Property	Units	Results	Test Method
Hardness Shore A	Points	70-80	ASTM D2240 (10 Second Reading)
Shrinkage	Percent	5 maximum	ASTM D1204
Brittleness		No crack remains flexible at temperature -37 degrees C (-35 degrees F)	ASTM D2497 13 mm (1/2-inch) Mandrel Bend

Retention of Properties after Heat Aging	Percent of original	80 Tensile 80 Breaking 80 Elongation	ASTM D3045, 90 degrees C (194 degrees F) for 168 hours

3. Manufacturer's standard sheet size with prefabricated or preformed inside and outside corners.
4. Sheet manufacturer's solvent welding liquid or xylene and edge sealant.

2.7 GROUTING MATERIALS:

A. Premium Pre-Mixed Urethane Polymer Resin Grout:
1. Water-based.
2. Color-coated quartz aggregate.
3. Built-in urethane sealer.
4. Antimicrobial.
5. Chemical and stain-resistant.
6. Crack-resistant.
7. UV-stable.

2.8 PATCHING AND LEVELING COMPOUND:

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Provide a patching and leveling compound with the following minimum physical properties:
1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28-day value).
3. Tensile strength – 4.1 MPa (600 psi) per ANSI 118.7.
4. Density – 1.9.

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 101 mm (4 inches) thick with fillers, being brought to a feather edge, and being troweled to a smooth finish.

D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

E. Ready for use in 48 hours after application.

2.9 METAL DIVIDER STRIPS:

A. Heavy top type strip with 3.2 mm (1/8 inch) wide top and 38 mm (1 1/2 inch) long leg. Height to match tile and setting-bed thickness.

B. Embedded leg perforated and deformed for keying to mortar.

C. Stainless-steel, ASTM A666, 300 Series exposed-edge material.

2.10 WATER:

A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.11 CLEANING COMPOUNDS:

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and bonded elastomeric waterproofing membrane.

B. Materials containing acid or caustic material are not acceptable.

2.12 FLOOR MORTAR BED REINFORCING:

A. ASTM A1064/A1064M welded wire fabric without backing, MW3 x MW3 (2 x 2-W0.5 x W0.5).

2.13 POLYETHYLENE SHEET:

A. Polyethylene sheet conforming to ASTM D4397.

B. Nominal thickness: 0.15 mm (6 mils).

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

A. Maintain ambient temperature of work areas at not less than 16 degrees C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three (3) days after installation.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.

C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).

D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).

E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after third day of completion of tile work.

3.2 ALLOWABLE TOLERANCE:

A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:

1. Not more than 6 mm in 3048 mm (1/4 inch in 10 feet) from required elevation where portland cement mortar setting bed is used.
2. Not more than 3 mm in 3048 mm (1/8 inch in 10 feet) where dry-set portland cement, and latex-portland cement mortar setting beds and bond coats are used.

B. Variation in Plane of Wall Surfaces:

1. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where dry-set or latex-portland cement mortar setting materials is used.

3.3 SURFACE PREPARATION:

A. Cleaning New Concrete or Masonry:

1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.

B. Patching and Leveling:

1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
   a. Thickness of compound as required.
   b. Float finish except finish smooth for elastomeric waterproofing.
   c. At substrate expansion and other moving joints, allow joint of same width to continue through underlayment.
3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

C. Mortar Bed for Slopes to Drains: (Patient Toilet Rooms with Showers)

1. Slope compound to drain where drains are shown on construction documents.
2. Install mortar bed sloped to drains not less than 1/4 inch per foot, nor more than 1/2 inch per foot.
3. Install mortar bed in a manner that does not damage waterproof membrane; 32 mm (1-1/2 inch) minimum thickness.
4. Screed for slope to drain and float finish.
5. Cure mortar bed for not less than seven (7) days. Do not use curing compounds or coatings.

6. Perform flood test to verify mortar bed slopes to drain before installing tile. Contracting Officer Representative (COR) to be present during flood test.

D. Cleavage Membrane:
   1. Install polythene sheet as cleavage membrane in depressed slab.
   2. Turn up at edge of depressed floor slab to top of floor.

E. Walls:
   1. In showers or other wet areas cover studs with polyethylene sheet.
   2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
   3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

F. Existing Floors and Walls:
   1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
   2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new waterproof membrane .

3.4 CEMENTITIOUS BACKER UNITS:

A. Remove polyethylene wrapping from cementitious backer units and separate to allow for air circulation. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.

B. Install in accordance with ANSI A118.9 except as specified otherwise.

C. Install units horizontally or vertically to minimize joints with end joints over framing members. Units with rounded edges; face rounded edge away from studs to form a "V" joint for joint treatment.

D. Secure cementitious backer units to each framing member with screws spaced not more than 203 mm (8 inches) on center and not closer than 13 mm (1/2 inch) from the edge of the backer unit or as recommended by backer unit manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.

E. Do not install joint treatment for seven (7) days after installation of cementitious backer unit.

F. Joint Treatment:
   1. Fill horizontal and vertical joints and corners with latex-portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.
   2. Leave 6 mm (1/4 inch) space for sealant at lips of tubs, sinks, or other plumbing receptors.

3.5 METAL DIVIDER STRIPS:

A. Install metal divider strips in floor joints between tile floors and adjacent flooring of other materials where the finish floors are flush, as well as at control joints, unless shown otherwise on construction documents.
B. Set divider strip in mortar bed to line and level centered under doors or in openings.

3.6 TILE - GENERAL:

A. Comply with ANSI A108/A118/A136 series of tile installation standards applicable to methods of installation and TCNA Installation Guidelines.
B. Setting Beds or Bond Coats:
   1. Set floor tile in latex-portland cement mortar, ANSI A108.5, over bonded waterproofing membrane per ANSI 108.13.
   2. Set wall tile installed over concrete backer board in latex-portland cement mortar, ANSI A108.5.
   4. Set trim shapes in same material specified for setting adjoining tile.
C. Workmanship:
   1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
   2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise on construction documents.
   3. Form intersections and returns accurately.
   4. Cut and drill tile neatly without marring surface.
   5. Cut edges of tile abutting penetrations, finish, or built-in items:
      a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
      b. Seal tile joints water-tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.

6. Completed work is to be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
   a. Rooms without Showers: TCNA TCNA F122-19 (on ground concrete) and TCNA F122A-19 (above ground concrete).
   b. Patient Toilet Rooms with Showers: TCNA B421C-19.
   c. Extend floor tile beneath casework and equipment.
   d. Align finish surface of new tile work flush with other and adjoining floor finish where indicated in construction documents.
   e. In areas where floor drains occur, slope tile to drains.
   f. Push and vibrate tiles over 203 mm (8 inches) square to achieve full support of bond coat.
9. Walls:
   a. Typical: TCNA W244C-19.
   b. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights as indicated in construction documents with tile.
   c. Finish reveals of openings with tile, except where other finish materials are indicated in construction documents.
   d. At window openings, provide tile stools and reveals.
   e. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.
10. Joints:
   a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise on construction documents.
   b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108/A118/A136 series of tile installation standards:
   a. Tile wall installations composed of tiles 203 by 203 mm (8 by 8 inches) or larger.

3.7 BONDED ELASTOMERIC WATERPROOFING MEMBRANE: (ROOMS WITHOUT SHOWERS)

A. Surface Preparation: Prepare surfaces as specified.

B. Installation of Bonded Elastomeric Waterproofing Membrane: ANSI A108.13.

1. Prime surfaces, where required, in accordance with manufacturer's instructions.
2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.76 to 1.3 mm (30 to 50 mils).
3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 101 mm (4 inches) above finish floor surface.
4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
5. After curing test for leaks with 25 mm (1 inch) of water for 24 hours.

3.8 BONDED WATERPROOFING MEMBRANE: (PATIENT TOILET ROOMS WITH SHOWERS)

A. Surface Preparation: Prepare surfaces as specified.

B. Installation of Bonded Elastomeric Waterproofing Membrane: ANSI A108.13.

1. Corners shall be carefully fitted and shall be made strong and watertight by folding or lapping, and each corner shall be reinforced with suitable webbing.
2. Folds, laps, and reinforcing webbing shall extend not less than 4 inches in all directions from corner and webbing shall produce a tensile strength of not less than 50 pounds per square foot in either direction.

3.9 GROUTING:

A. Grout Type and Location:

1. Grout for glazed wall and base tile, and mosaic wall tile portland cement grout, latex-portland cement grout, or dry-set grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Water-Cleanable Grout: ANSI A118.3.

3.10 MOVEMENT JOINTS:

A. Prepare tile expansion and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.

B. TCNA details EJ 171.

C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof membrane.

D. Rake out grout at joints between tile, service sink, and at toe of base not less than 6 mm (1/4 inch) deep.

3.11 CLEANING:

A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.

B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.

C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.

3.12 PROTECTION:

A. Keep traffic off tile floor, until grout and setting material is fully set and cured.

B. Where traffic occurs over tile floor is unavoidable, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

3.13 TESTING FINISH FLOOR:

A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

- - - E N D - - -

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical units.
2. Metal ceiling suspension system for acoustical ceilings.

1.2 RELATED REQUIREMENTS

A. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
4. C634-13 - Terminology Relating to Environmental Acoustics.
5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. D1779-98(2011) - Adhesive for Acoustical Materials.
8. E84-15b - Surface Burning Characteristics of Building Materials.
9. E119-16 - Fire Tests of Building Construction and Materials.
10. E413-16 - Classification for Rating Sound Insulation.
11. E1264-14 - Classification for Acoustical Ceiling Products.

C. International Organization for Standardization (ISO):

1. ISO 14644-1 - Classification of Air Cleanliness.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Ceiling suspension system indicating manufacturer recommendation for each application.
3. Installation instructions.
4. Warranty.

C. Samples:
   1. Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.
   2. Suspension system, trim and molding, 300 mm (12 inches) long.
   3. Colored markers for access service.

D. Operation and Maintenance Data:
   1. Care instructions for each exposed finish product.

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. Environment:
   1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
   2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
   3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Ceiling System: Acoustical ceilings units on exposed grid suspension systems.

2.2 SYSTEM PERFORMANCE

A. Design product complying with specified performance:
   1. Maximum Deflection: 1/360of span, maximum.

B. Surface Burning Characteristics: When tested according to ASTM E84.

1. Flame Spread Rating: 25 maximum.
2. Smoke Developed Rating: 450 maximum.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide acoustical units from one manufacturer.

1. Provide each product exposed to view from one production run.

C. Provide suspension system from same manufacturer.

2.4 ACOUSTICAL UNITS

A. General:

1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
   a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
2. Classification: Provide type and form as follows:
   a. AT-1: Type III Units - Mineral base with water-based painted finish maximum 10 g/l VOC; Form 2 - Water felted, minimum 16 mm (5/8 inch) thick.
   b. AT-2: Type IV Units - Mineral base with membrane-faced overlay, Form 2 - Water felted, minimum 16 mm (5/8 inch) thick. Apply poly (vinyl) chloride over paint coat.
   c. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55 unless specified otherwise.
   d. CAC (Ceiling Attenuation Class): ASTM E413, 33 unless specified otherwise.
   e. LR (Light Reflectance): Minimum 0.80.
3. Lay-in panels: Sizes as indicated on Drawings, with reveal edges.
   a. Sizes:
      1) Edge and Joint Detail: Angled Tegular edges and joints as required to suit suspension and access system.

B. SPECIAL FACED ACOUSTICAL TILE UNITS AT(SP): Anti-microbial coated surfaces suitable for use in Class 5 Clean Rooms per ISO 14644-1. Special faced acoustical tile units shall meet all general requirements stated in this specification. See Class IV product (AT-2) specified above.

2.5 METAL SUSPENSION SYSTEM

A. General: ASTM C635, heavy-duty system, except as otherwise specified.

1. Suspension System: Provide the following:
   a. Galvanized cold-rolled steel, bonderized.

B. Exposed Grid Suspension System: Support of lay-in panels.

1. Grid Width: 22 mm (7/8 inch) minimum with8 mm (5/16 inch) minimum panel bearing surface.
2. Molding: Fabricate from the same material with same exposed width and finish.
3. Finish: Baked-on enamel flat texture finish.
   a. Color: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.
   1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).

D. Clips: Galvanized steel, designed to secure framing member in place.

E. Tile Splines: ASTM C635.

F. Wire: ASTM A641.
   1. Size:
      a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
      b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

2.6 ACCESSORIES

A. Perimeter Seal: Vinyl, polyethylene or polyurethane open cell sponge material, density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
   1. Thickness: As required to fill voids between back of wall molding and finish wall.
   2. Size: Minimum 9 mm (3/8 inch) wide strip.

B. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.
   1. Color Code: Provide the following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water
Orange	Ductwork: Fire Dampers
Blue	Ductwork: Dampers and Controls
Black	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
   1. Dispose of other removed materials.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions .

3.3 ACOUSTICAL UNIT INSTALLATION

A. Layout acoustical unit symmetrically, with minimum number of joints.

B. Installation:

1. Install acoustic tiles after wet finishes have been installed and solvents have cured.
2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
   a. Install tile to lay level and in full contact with exposed grid.
   b. Replace cracked, broken, stained, dirty, or tile.
3. Markers:
   a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
   b. Attach colored markers to exposed grid on opposite sides of the units providing access.
   c. Attach marker on exposed ceiling surface of upward access acoustical unit.

C. Touch up damaged factory finishes.

1. Repair painted surfaces with touch up primer.

3.4 CEILING SUSPENSION SYSTEM INSTALLATION

A. General: Install according to ASTM C636.

1. Use direct or indirect hung suspension system or combination of both.
2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
4. Provide additional hangers located at each corner of support components.
5. Provide main runners minimum 1200 mm (48 inches) in length.
6. Install hanger wires vertically. Angled wires are not acceptable.

B. Direct Hung Suspension System: ASTM C635.

1. Support main runners by hanger wires attached directly to the structure overhead.
2. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

C. Anchorage to Structure:

1. Concrete:

a. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.

2. Steel:

a. Install carrying channels for attachment of hanger wires.

1) Size and space carrying channels to support load within performance limit.

2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.

b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.

c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

3.5 CEILING TREATMENT

1. Moldings:

2. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.

3. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.

B. Perimeter Seal:

1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.

2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

3.6 CLEANING

A. Clean exposed surfaces. Remove contaminants and stains.

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SECTION 09 54 16
LUMINOUS CEILINGS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

a. Luminous ceilings.

1.2 RELATED WORK:

A. Ceiling grid and installation: Section 09 51 00, ACOUSTICAL CEILINGS.

B. Wall-mounted units similar to luminous sky-image ceilings: Section 12 11 13, EDGE-ILLUMINATED PHOTO MURALS.

C. Power connections and installation of lamps and power converters for LED lamps: Division 26, ELECTRICAL.

1.3 DELIVERY, STORAGE AND HANDLING:

A. Deliver products in manufacturer’s original packaging. Store materials indoors in location that is secure, dry, and has stable temperature. Handle in accordance with manufacturer’s instructions to prevent damage.

1.4 AMBIENT CONDITIONS:

A. Do not install until permanent HVAC equipment is working, ambient temperature and humidity has stabilized, and other work above luminous sky-image ceilings is completed.

1.5 SUBMITTALS:

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit the following:

1. Shop Drawings: Submit drawings showing construction, sizes and shape of luminous sky-image ceilings; identification of artwork; layout and orientation if image tiles; wiring diagram; and coordination with adjacent work.
2. Product Data: Submit for each type of product specified.
3. Artwork Sample: Submit three by three inch samples showing quality of graphic reproduction.
4. Manufacturer’s Instructions: Submit manufacturer’s installation instructions.
5. Operation and Maintenance Data:
   a. Submit manufacturer’s operation and maintenance instructions.
   b. Submit copy of manufacturer’s program for image tile replacement.
6. Warranty Documentation: Submit sample of manufacturer’s limited warranty.

1.6 WARRANTY:

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

B. Provide manufacturer's ten-year, pro-rated, limited warranty against visible fade or color shift in image tiles.

PART 2 - PRODUCTS

2.1 LUMINOUS CEILINGS:

A. Basis of Design: Equal to Luminous SkyCeilings sky-image ceilings manufactured by Sky Factory, Inc.; phone: 641-472-1747; fax: 641-472-1014; www.skyfactory.com; info@SkyFactory.com.

B. Light Boxes:

1. Back-illumination distribution uniformly over visible surface of image tiles without fall-off at edges, hot spots, or shadows.
2. Image tiles installable and removable without use of doors.
3. Image tiles fully visible between ceiling suspension grids.
4. Installable in 5-inch minimum clearance from face of ceiling suspension grids to structure or other obstructions above.
5. Fabricate from painted sheet aluminum.
6. Units shall bear UL & CE label, and operate on power characteristics shown on Drawings.
7. Provide the following type:
   a. Dimmable LED Light Boxes: Lamps shall be light-emitting diode (LED) arrays with 6500 K color temperature (daylight balanced), 40,000-hour estimated service life. Provide 24 DC Power System, dimmable from 0 to 100 percent, for installation as specified in Division 26, ELECTRICAL.

C. Image Tiles:

1. Print images on translucent graphic media with high-quality, UV-resistant, pigmented inks.
2. Laminate images between acrylic sheet approved for use in light fixtures and a clear cover film.
3. Artwork: Equal to Sky Factory, "Pine and Fir", No. 9ai.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine area receiving work of this Section to identify conditions that may adversely affect installation. Do not begin installation until adverse conditions have been remedied.

3.2 INSTALLATION OF SKY-IMAGE CEILINGS:

A. Install in accordance with manufacturer’s instructions and approved shop drawings.

B. Install elevators and light boxes.

C. Make connections to power and install lamps as specified in Division 26, ELECTRICAL.

D. Install image tiles. Orient artwork as shown on approved shop drawings.

E. Repair damage and adjust installation, if required, to provide attractive appearance, provide uniform illumination across face of image tiles, and optimize visual illusion of sky.

3.3 CLEANING:

A. Clean image tiles and reflective surfaces inside light boxes in accordance with manufacturer’s instructions.

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SECTION 09 51 UL
GESIPIENT RASE AN- ACCESSOGIES

.AGT U M YENEGAP

U2U SDQQAG3

A. Section Includes:

1. Resilient base (RB) adhered to interior walls and partitions.

U2B GEPATE- GE4DIGEQENTS

A. Sheet Flooring Integral Base: Section 09 65 16, RESILIENT SHEET FLOORING.

U2L A..PICARPE .DRPICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. F1861-08(2012)e1 - Resilient Wall Base.

U2V SDRQITTAPS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Adhesives and primers indicating manufacturer's recommendation for each application.
3. Installation instructions.

C. Samples:

1. Resilient Base: 150 mm (6 inches) long, each type and color.

D. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

U21 -EPI6EG3

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.

U25 STOGAYE AN- HAN-PINY

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage when handling and during construction operations.

U27 FIEP- CON-ITIONS

A. Environment:

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.

2. Work Area Ambient Temperature Range: 21 to 27 degrees C (70 to 80 degrees F) continuously, beginning 48 hours before installation.
3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

U28 WAGGANT3

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

.AGT B M .GO-DCTS

B2U .GO-DCTS

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide each product from one manufacturer and from one production run.

B2B GESIPIENT RASE

A. Resilient Base: 3 mm (1/8 inch) thick, 100 mm (4 inches) high.
   1. Type: Rubber or vinyl; use one type throughout.
   2. ASTM F1861, Type TP thermoplastic rubber or Type TV thermoplastic vinyl, Group 2 - layered.
B. Applications:
   1. Carpet Flooring Locations: Style A - Straight.
   2. Other Locations: Style B - Cove.

B2L A-HESI6ES

A. Adhesives: Low pollutant-emitting, water-based type recommended by adhered product manufacturer for each application.

.AGT L M EXECDTION

L2U .GE.AGATION

A. Examine and verify substrate suitability for product installation.
B. Protect existing construction and completed work from damage.
C. Remove existing base to permit new installation.
   1. Dispose of removed materials.
D. Correct substrate deficiencies.
   1. Fill cracks, pits, and depressions with leveling compound.
   2. Remove protrusions; grind high spots.
   3. Apply leveling compound to achieve 3 mm (1/8 inch) in 3 m (10 feet) maximum surface variation.
E. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
F. Allow substrate to dry and cure.
G. Perform flooring manufacturer’s recommended bond, substrate moisture content, and pH tests.

L2B INSTAPPATION YENEGAP

A. Install products according to manufacturer's instructions.
   1. When instructions deviate from specifications, submit proposed resolution for Contracting Officer consideration.

L2L GESIPIENT RASE INSTAPPATION

A. Applications:
   1. Install resilient base in rooms scheduled on Drawings.
   2. Install resilient base on casework and other curb supported fixed equipment.
   3. Extend resilient base into closets, alcoves, and cabinet knee spaces, and around columns within scheduled room.

B. Lay out resilient base with minimum number of joints.
   1. Length: 600 mm (24 inches) minimum, each piece.
   2. Locate joints 150 mm (6 inches) minimum from corners and intersection of adjacent materials.

C. Installation:
   1. Apply adhesive uniformly for full contact between resilient base and substrate.
   2. Set resilient base with hairline butted joints aligned along top edge.

D. Factory form corners and end stops.

E. Roll resilient base ensuring complete adhesion.

L2V CPEANINY

A. Remove excess adhesive before adhesive sets.

B. Clean exposed resilient base. Remove contaminants and stains.
   1. Clean with mild detergent. Leave surfaces free of detergent residue.

C. Polish exposed resilient base to gloss sheen.

L21 .GOTECTION

A. Protect products from construction traffic and operations.
   1. Maintain protection until directed by Contracting Officer's Representative.

B. Replace damaged products and re-clean.
   1. Damaged Products include cut, gouged, scraped, torn, and unbonded products.

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SECTION 09 51 U5
LESIGIENT SPEET RGOOLIN-

.ALT U M -ENELAG

UYU S2DDALQ

A. Section Includes:

1. Welded seam sheet flooring (WSF) with heat welded seams and integral cove base.

UY3 LEGATEB LE42ILEDENTS

A. Color, Pattern and Texture: Section 09 06 00, SCHEDULE FOR FINISHES.

UYV A..GICA6GE .26GICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. D4259-88(2012) - Abrading Concrete.
2. E648-15e1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
3. E662-15a - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
4. F1303-04(2014) - Sheet Vinyl Floor Covering with Backing.

C. International Concrete Repair Institute (ICRI):

1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair.

D. SCS Global Services (SCS):

1. FloorScore.

UYH S26DITTAGS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1. Show size, configuration, and fabrication and installation details.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Installation instructions.
3. Warranty.

C. Samples:

1. Sheet material, each color and pattern with welded seam using specified welding rod 300 mm (12 inches) square for each type, pattern and color.
2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.
3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.

4. Primer: Pint container, each type.

UY1 BEGI7ELQ

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.

UY5 STOLA-E ANB PANBGIN-

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

UYF RIEGB CONBITIONS

A. Environment:

1. Work Area Ambient Temperature Range: Minimum 18 to 38 degrees C (65 to 100 degrees F) continuously, beginning 48 hours before installation. Maintain room temperature above 18 degrees C (65 degrees F) after installation.
2. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

UY8 WALLANTQ

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

B. Manufacturer's Warranty: Warrant resilient sheet flooring against material and manufacturing defects.

1. Warranty Period: 2 years.

.ALT 3 M .LOB2CTS

3YU SQSTED .ELROLDANCE

A. Sheet Flooring:

1. Critical Radiant Flux: ASTM E648; 0.45 watts per sq.cm or more, Class I.
2. Smoke Density: ASTM E662; less than 450.

3Y3 .LOB2CTS M -ENELAG

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide vinyl sheet color and pattern from one production run.

3YV LESIGIENT SPEET RGOOLIN- WITP PEATMWEGBEB SEADS

A. Resilient Sheet Flooring: ASTM F1303; Type I, Grade 1, vinyl, with backing Class A, fused non-cushioned.

1. Wear Surface: HP Urethane Coating with ceramic bead

2. Wear Layer Thickness: Minimum 0.51 mm (0.020 inches).
3. Total Thickness: 2.3 mm (0.10 inches).

B. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
1. Minimum Width: 1200 mm (48 inches).

3YH ACCESSOLIES

A. Welding Rod: Flooring manufacturer's standard, in color matching field color of sheet flooring.
B. Adhesives: Water resistant type recommended by flooring manufacturer to suit application.
C. Base Accessories:
1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with flooring material.
2. Cap Strip: Zero edge extruded flanged reducer strip compatible with flooring material approximately 25 mm (1 inch) exposed height with 13 mm (1/2 inch) flange.
D. Leveling Compound:
1. Provide cementitious type with latex or polyvinyl acetate resins additive.
E. Primer:
1. Type recommended by adhesive or flooring manufacturer.
F. Edge Strips: Specified under other adjacent flooring sections.
G. Sealant:
1. As specified in Section 07 92 00, JOINT SEALANTS.
2. Compatible with flooring.

.ALT V M EXEC2TION

VYU .LE.ALATION

A. Examine and verify substrate suitability for product installation.
B. Protect existing construction and completed work from damage.
C. Remove existing flooring to permit new installation.
1. Do not use solvents for removing adhesives.
2. Dispose of removed materials.
D. Ensure interior finish work such as drywall finishing, ceiling work, and painting work is complete and dry before installation.
1. Complete mechanical, electrical, and other work above ceiling line.
2. Ensure heating, ventilating, and air conditioning systems are installed and operating in order to maintain temperature and humidity requirements.

E. Correct substrate deficiencies.
   1. Fill cracks, pits, and dents with leveling compound.
   2. Grind, sand, or cut away protrusions. Grind high spots.
   3. Level flooring substrate to 3 mm (1/8 inch) maximum variation.

F. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
   1. Mechanically clean concrete floor substrate according to ASTM D4259.
   2. Surface Profile: ICRI 310.2R CSP 3 to CSP 4.

G. Perform flooring manufacturer’s recommended bond, substrate moisture content, and pH tests.

H. Broom or vacuum clean substrates immediately before flooring installation.

I. Primer: Apply primer according to manufacturer’s instructions.

VY3 INSTAGGATION M -ENELAG

A. Install products according to manufacturer's instructions.
   1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

VYV INSTAGGATION OR RGOOLIN-

A. Flooring Layout:
   1. Arrange pattern in one direction with side joints pattern matched.
   2. Extend flooring wall-to-wall, under cabinets, casework, and other equipment for seamless flooring installation.
   3. Arrange sheets to minimize seams.
   4. Locate seams in inconspicuous and low traffic areas, minimum 150 mm (6 inches) away from parallel joints in flooring substrates.

B. Match edges of flooring for color shading and pattern at seams.

C. Install flooring flush with adjacent floor finishes.

D. Extend flooring into toe spaces, door reveals, closets, and similar openings.

E. Install flooring fully adhered to substrate.
   1. Air pockets or loose edges are not acceptable.
   2. Trim sheet materials tight to flooring penetrations; seal joints at pipe with waterproof sealant specified in Section 07 92 00, JOINT SEALANTS.

F. Butt joints tight, without gaps and bulges.

VYH INTE-LAG CO7E 6ASE INSTAGGATION

A. Set preformed fillet strip at floor intersection with walls and other vertical surfaces.

B. Extend flooring over fillet strip and 4 inches up wall surface (6 inches at Patient and Exam Rooms).

C. Form straight or radius internal and external corners to suit Application.

D. Adhere base to wall surface.

E. Terminate base exposed top edge with cap strip. Seal cap strip to wall with sealant.

F. Weld joints as specified for flooring.

VY1 PEAT WEGBIN-

A. Heat weld joints of flooring and base using welding rod.

B. Rout joint, insert welding rod into routed space, and fuse flooring and welding rods for seamless, watertight installation.

1. Fuse joints for seamless weld.

C. Finish joints flush, free from voids, and recessed or raised areas.

VY5 CGEANIN-

A. Remove excess adhesive before adhesive sets.

B. Clean and polish materials.

C. Vacuum floor thoroughly.

D. Perform initial maintenance according to flooring manufacturer’s instructions.

1. Delay washing flooring until adhesive is fully set and welded joints can contain wash water.

VYF .LOTECTION

A. Protect flooring from traffic and construction operations.

B. Keep traffic off sheet flooring for minimum 24 hours after installation.

C. Cover flooring with reinforced kraft paper, and plywood or hardboard.

D. Remove protective materials immediately before acceptance.

E. Repair damage.

F. Buff flooring to uniform sheen.

- - E N D - -

SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the installation of luxury vinyl tile and accessories required for a complete installation.

1.2 RELATED WORK:

A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

B. Subfloor Testing and Preparation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

C. Color, Pattern and Texture for Resilient Tile Flooring and Accessories: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

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

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Resilient material manufacturer’s recommendations for adhesives, underlayment, primers, and polish.
3. Application, installation and maintenance instructions.

C. Samples:

1. Tile: Each type, color, thickness and finish.
2. Edge Strips: Each type, color, thickness and finish.
3. Feature Strips: Each type, color, thickness and finish.

D. Shop Drawings:

1. Layout of patterns as shown on the construction documents.
2. Edge strip locations showing types and detail cross sections.

E. Test Reports:

1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.
2. Moisture and pH test results as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.4 DELIVERY:

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged or opened prior to installation are not acceptable.

1.5 STORAGE:

A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

A. Installer Qualifications: A company specializing in installation with minimum three (3) years' experience and employs experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program.

1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
   a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
   b. Career long training.
   c. Manufacturer endorsed training.
   d. Fundamental journeyman skills certification.

B. Furnish product type materials from the same production run.

1.7 WARRANTY:

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

1.8 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

D2047-11 .....Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

D4078-02(R2008) .....Water Emulsion Floor Finish

E648-14c .....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-14 .....Specific Optical Density of Smoke Generated by Solid Materials

E1155/E1155M-14 .....Determining Floor Flatness and Floor Levelness Numbers

F510/F510M-14 .....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method

F710-11 .....Preparing Concrete Floors to Receive Resilient Flooring

F925-13 .....Test Method for Resistance to Chemicals of Resilient Flooring

F1869-11 .....Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

F2170-11 .....Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes

F2195-13 .....Linoleum Floor Tile

C. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

D. International Standards and Training Alliance (INSTALL):

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.

B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.

C. Smoke Density: Less than 450 per ASTM E662.

D. Slip Resistance – Not less than 0.5 when tested with ASTM D2047.

2.2 LUXURY VINYL TILE:

A. ASTM F1700, Class III, Printed Film Vinyl Tile, Type A.

B. Thickness: 12 mil (1/8 inch).

C. Size: See Color Schedule found in Construction Drawings

D. Provide products with recycled content with not less than 30 percent.

E. Chemical Resistance: ASTM F925; pass.

2.3 ADHESIVES:

A. Provide water resistant type adhesive for flooring, base and accessories as recommended by the manufacturer to suit substrate conditions. VOC content to be less than the 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24). Submit manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics.

2.4 PRIMER FOR CONCRETE SUBFLOORS:

A. Provide in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.5 LEVELING COMPOUND FOR CONCRETE FLOORS:

A. Provide cementitious products with latex or polyvinyl acetate resins in the mix in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.6 POLISH AND CLEANERS:

A. Cleaners: As recommended in writing by floor tile manufacturer.

B. Polish: ASTM D4078.

2.7 MOULDING:

A. Provide tapered mouldings of vinyl rubber, colored anodized aluminum, clear anodized aluminum and types as indicated on the construction documents for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 6 mm (1/4 inch). Provide bevel change in level between 6 and 13 mm (1/4 and 1/2 inch) with a slope no greater than 1:2.

B. Fasteners for Aluminum Mouldings: Stainless steel of type required for substrate condition.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

B. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

3.2 SUBFLOOR TESTING AND PREPARATION:

A. Prepare and test surfaces to receive resilient tile and adhesive as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

B. Prepare concrete substrates in accordance with ASTM F710.

3.3 INSTALLATION:

A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.

B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.

C. Tile Layout:

1. If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned.
2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than one half the field tile size, except where irregular shaped rooms make it impossible.
3. Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.

D. Application:

1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
4. Roll tile floor with a minimum 45 kg (100 pound) roller.

E. Seal joints at pipes with sealants in accordance with Section 07 92 00, JOINT SEALANTS.

F. Installation of Edge Strips:

1. Locate edge strips under center line of doors unless otherwise shown on construction documents.

2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws.
3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION:

A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.

B. Keep traffic off resilient material for a minimum 72 hours after installation.

C. Clean flooring as recommended in accordance with manufacturer’s printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer’s written instructions.

D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.

E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and mouldings, re-clean resilient materials.

3.5 LOCATION:

A. Unless otherwise indicated in construction documents, install tile flooring, under areas where casework, laboratory and pharmacy furniture and other equipment occur.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 67 23.20
RESINOUS (EPOXY BASE) WITH DECORATIVE QUARTZ DOUBLE BROADCAST

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies flooring system of resinous epoxy base with decorative quartz double broadcast, epoxy sealer, and urethane topcoat with integral cove base.

1.2 RELATED WORK

A. Concrete and Moisture Vapor Barrier: Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Substrate Preparation for Floor Finishes: Section 09 05 16.

C. Colors: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.

D. Floor Drains: Division 22, PLUMBING.

1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Description of each product to be provided.
2. Application and installation instructions.
3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.

C. Qualification Data: For Installer.

D. Samples:

1. Samples for Selection: For each (color and texture) resinous flooring system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.
2. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.

E. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:

1. Edge configuration.

F. Certifications and Approvals:

1. Manufacturer's certification of material and substrate compliance with specification.
2. Manufacturer's approval of installers.

3. Contractor's certificate of compliance with Quality Assurance requirements.

G. Warranty: As specified in this section.

1.4 QUALITY ASSURANCE

A. Manufacture Certificate: Manufacture shall certify that a particular resinous flooring system has been manufactured and in use for a minimum of five (5) years.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a minimum period of five (5) years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
2. Contractor shall have completed at least ten (10) projects of similar size and complexity. Include list of at least five (5) projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
3. Installer's Personnel: Employ persons trained for application of specified product.

C. Source Limitations:

1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.

D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and establish quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch (1200 mm)square floor area selected by VA COR.
   a. If applicable include 48-inch (1200 mm)length of integral cove base.

2. Approved mockups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
3. Sign off from VA COR on texture for slip resistance and clean ability must be complete before installation of flooring system.

E. Pre-Installation Conference:
1. Convene a meeting not less than thirty days prior to starting work.
2. Attendance:
a. Contractor
b. VA COR
c. Manufacturer and Installer's Representative
3. Review the following:
a. Environmental requirements
1) Air and surface temperature
2) Relative humidity
3) Ventilation
4) Dust and contaminates
b. Protection of surfaces not scheduled to be coated
c. Inspect and discus condition of substrate and other preparatory work performed
d. Review and verify availability of material; installer’s personnel, equipment needed
e. Design and edge conditions.
f. Performance of the coating with chemicals anticipated in the area receiving the resinous (urethane and epoxy mortar/cement) flooring system
g. Application and repair
h. Field quality control
i. Cleaning
j. Protection of coating systems
k. One-year inspection and maintenance
l. Coordination with other work

F. Manufacturer’s Field Services: Manufacturer’s representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.

G. Contractor Job Site Log: Contractor shall document daily; the work accomplished environmental conditions and any other condition event significant to the long-term performance of the urethane and epoxy

mortar/cement flooring materials installation. The Contractor shall maintain these records for one year after Substantial Completion.

1.5 MATERIAL PACKAGING DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.

C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).

D. Keep containers sealed until ready for use.

E. Do not use materials beyond manufacturer’s shelf life limits.

F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages. No On site weighing or volumetric measurements are allowed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) and humidity less than 70% during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

D. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

1.7 WARRANTY

A. Work subject to the terms of the Article “Warranty of Construction” FAR clause 52.246-21.

B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for an extended period of three (3) full years from date of installation, or provide a joint and several warranty signed on a single document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of three (3) full years from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

1.8 APPLICABLE PUBLICATIONS

A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. ASTM Standard C722-04 (2012), "Standard Specification for Chemical-Resistant Monolithic Floor Surfacings," ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/C0722-04R12, www.astm.org.

1. Specification covers the requirements for aggregate-filled, resin-based, monolithic surfacings for use over concrete.

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

D570 (2018) .....Standard Test Method for Water Absorption of Plastics

D635 (2018) .....Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

D638 (2010) .....Tensile Properties of Plastics

D695 (2015) .....Standard Test Method for Compressive Properties of Rigid Plastics

D1308 (2013) .....Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D2240 (2015) .....Rubber Property—Durometer Hardness

D4060 (2014) .....Abrasion Resistance of Organic Coatings by the Taber Abraser

D2047(2017) .....Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

D2370 (2016) .....Standard Test Method for Tensile Properties of Organic Coatings

D3960 (2018) .....Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

D4259 (2012) .....Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance

D4541 (2017) .....Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

D7234 (2019 .....Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.

E96/E96M (2015) .....Water Vapor Transmission of Materials

F1869 (2011) .....Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

F2170 (2011) .....Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. System Descriptions:

1. A double broadcast of decorative quartz into a high solids epoxy, sealed with a UV resistant epoxy and top-coated with a light-stable urethane which has a satin appearance.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers of broadcast and installation method. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. 1st Broadcast Coat:

a. Resin: Epoxy.

b. Formulation Description: Neutral, two-component, high solids.

c. Application Method: squeegee, back roll and broadcast.

d. Thickness of Epoxy: 10-12 mil.

e. Number of Coats: One.

f. Aggregates: Quartz broadcast into wet epoxy.

2. 2nd Broadcast Coat:

a. Resin: Epoxy.

b. Formulation Description: Neutral, two-component, high solids.

c. Application Method: squeegee, back roll and broadcast.

d. Thickness of Epoxy: 15 mil.

e. Number of Coats: One.

f. Aggregates: Quartz broadcast into wet epoxy.

3. Sealer Coat:

a. Resin: Epoxy.

b. Formulation Description: Two-component, high solids, UV-resistant.

c. Thickness of coat(s): 15 mil.

d. Number of Coats: One.

e. Application: Squeegee and finish roll.

4. Topcoat:

a. Moisture-Cure Urethane.

b. Formulation Description: Clear three-component, aliphatic.

c. Type: Clear.

d. Thickness of coat(s): 3 mil.

e. Number of Coats: One.

f. Application: roller.

D. System Characteristics:

1. Integral cove base: 2-inch (50.8 mm) radius resinous flooring system with right angle metal cove strip termination.

2. Overall System Thickness: Nominal 1/8 inch.

3. Finish: Satin.

E. Physical Properties:

1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Tensile Strength	ASTM D2370	8,000 psi
Volatile Organic Compound Limits (V.O.C.)	ASTM D3960	Below 100 g/l
Compressive Strength	ASTM D695	13,500 psi
Water Absorption	ASTM D570	0.2% weight increase
Flammability	ASTM D635	182 mm/min
Abrasion Resistance	ASTM D4060	18 mg/loss
Coefficient of Friction	ASTM D2047	.63
Shore D Hardness	ASTM D2240	80-85 @0 sec, 75-80 @ 15 sec
Bond Strength	ASTM D4541	4,550 psi to concrete failure

Bond Strength	ASTM D7234	732 psi to concrete failure

F. Chemical Resistance in accordance ASTM D1308 - 02(2007) "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes". ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/D1308-02R07, www.astm.org. No effect to the following exposures:

1. Acetic acid (10%)
2. Ammonium hydroxide (10%)
3. Citric Acid (10%)
4. Fatty Acid
5. Motor Oil, 20W
6. Hydrochloric acid (10%)
7. Sodium Chloride
8. Sodium Hypochlorite (20%)
9. Sodium Hydroxide (50%)
10. Sulfuric acid (37%)

2.2 SUPPLEMENTAL MATERIALS

A. Elastomeric Joint Sealant: Type recommended or produced by resinous flooring manufacturer for control joint isolation and floor termination/transition to adjacent flooring.

B. Flexible Epoxy Waterproof Membrane: Type recommended or produced by manufacturer of resinous floor coatings for rooms with showers.

C. Fill Materials:

1. Self-Leveling Cementitious Urethane Mortar: Type recommended or produced by manufacturer of resinous floor coatings for fill at concrete cut-out surrounding shower floor drain.
2. Cementitious Mortar: Type recommended or produced by manufacturer of resinous floor coatings for sloping of floors to shower drains.

2.3 TROWELED COVE BASE

A. Same physical properties as specified resinous flooring system.

2.4 BASE CAP STRIP

A. Aluminum, Extruded: ASTM B221, Alloy 6063-T6.

B. Shape for 3/16-inch (4.76 mm) depth of base material, "J" configuration.

C. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
2. Aluminum: NAAMM Amp 501:
   a. Clear anodic coating, AA-C22A41 chemically etched medium matte with Architectural Class 1, 0.7 mils (0.018 mm) or thicker.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where monolithic resinous system with integral base is to be installed with the VA COR.

B. Moisture Vapor Emission Testing: Perform moisture vapor transmission testing in accordance with ASTM F1869 to determine the MVER of the substrate prior to commencement of the work. See section 3.4, 3.

3.2 PROJECT CONDITIONS

A. Maintain temperature of rooms (air and surface) where work occurs, between 65 and 85 degrees F (18 and 29 degrees C) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 70 degrees F (21 degrees C) during cure period.

B. Maintain relative humidity less than 70 percent.

C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

D. Maintain proper ventilation of the area during application and curing time period.
   1. Comply with infection control measures of the VA Medical Center.

3.3 INSTALLATION REQUIREMENTS

A. The manufacturer's instructions for application and installation shall be reviewed with the VA COR for the seamless resinous flooring system with integral cove base.

B. Substrate shall be approved by manufacturer’s technical representative.

3.4 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
   1. Prepare concrete substrates as recommended by resinous flooring manufacturer.

2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
3. Verify that concrete substrates are dry.
   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of [3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
   b. MVT threshold for monolithic resinous flooring shall not exceed 3 lbs/1000 square feet (0.0001437 kPa) in a 24 hour period.
   c. When MVT emission exceeds this limit, apply manufacturer’s recommended vapor control primer or other corrective measures as recommended by manufacturer prior to application of flooring or membrane systems.
   d. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75-80% percent.
   e. Provide a written report showing test placement and results.
4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for flooring manufacturer recommended joint fill material, and concrete crack treatment.
F. Install undercoats (e.g. water proofing membrane, and/or sloped fill) as recommended by resinous flooring manufacturer.
G. Prepare wall to receive integral cove base:
   1. Verify wall material is acceptable for resinous flooring application, if not, install material (e.g. cement board) to receive base.

2. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane) as recommended by resinous flooring manufacturer.
3. Install base prior to flooring if required by resinous flooring manufacturer.
4. Grind, cut or sand protrusions to receive base application.

3.5 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
   2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
   3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
      a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate for all areas to receive integrated cove base.

C. Apply cove base: Trowel to wall surfaces at a 2 inch radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.

D. First Broadcast Application of Decorative Quartz:
   1. Apply seed coat for first quartz broadcast in accordance with manufacturer’s instructions.
   2. First Quartz Broadcast:
      a. Immediately broadcast quartz to excess into uncured seed coat in accordance with manufacturer’s instructions.
      b. Cover uncured seed coat completely with quartz.
   3. Allow system to cure in accordance with manufacturer’s instructions.
   4. Remove loose quartz from surface.

E. Second Broadcast Application of Decorative Quartz:
   1. Apply seed coat for second quartz broadcast in accordance with manufacturer's instructions.
   2. Second Quartz Broadcast:
      a. Immediately broadcast quartz to excess into uncured seed coat in accordance with manufacturer's instructions.
      b. Cover uncured seed coat completely with quartz.
   3. Allow system to cure in accordance with manufacturer's instructions.
   4. Remove loose quartz from surface.

F. Seal Coat Application: Apply seal coat in accordance with manufacturer's instructions.

G. Topcoat Application:
   1. Apply topcoat in accordance with manufacturer's instructions.
   2. Apply topcoat after seal coat within recoat window in accordance with manufacturer's instructions.
   3. Apply topcoat to match approved samples submitted in accordance with the Submittals Article of this Section.

3.6 TOLERANCE

A. From line of plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base. Broadcast resinous flooring system will contour substrate. Deviation and tolerance are subject to concrete tolerance.

B. From radius of cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

3.7 ENGINEERING DETAILS

A. Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.

B. Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

C. Treat floor drains by chasing the flooring system to lock in place at point of termination.

D. Treat control joints to bridge potential cracks and to maintain monolithic protection. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

E. Discontinue Resinous floor system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.8 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous flooring materials from damage and wear during construction operation.

1. Cover flooring with kraft type paper.
2. Optional 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.

D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

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SECTION 09 68 00
CARPETING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Section specifies carpet, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK:

A. Manufacturer, Color and Style of Carpet and Edge Strip: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Resilient Wall Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

C. Testing of Concrete Floors Before Installation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: A company specializing in carpet installation with a minimum three (3) years' experience and employing experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program, and a valid OSHA 10 certification.

1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
   a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
   b. Career long training.
   c. Manufacturer endorsed training.
   d. Fundamental journeyman skills certification.

1.4 SUBMITTALS:

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

B. Product Data:

1. Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading and flame resistance characteristics for each type of carpet material and installation accessory.
2. Manufacturer's printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.

C. Samples:

1. Carpet: "Production Quality" samples 305 x 305 mm (12 x 12 inches) of carpets, showing quality, pattern and color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Floor Edge Strip (Molding): 152 mm (6 inches) long of each color and type specified.
3. Base Edge Strip (Molding): 152 mm (6 inches) long of each color specified.

D. Shop Drawings: Installers layout plan showing seams and cuts for sheet carpet and carpet module.

E. Maintenance Data: Carpet manufacturer’s maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.

F. Installer’s Qualifications.

G. Manufacturer’s warranty.

1.5 DELIVERY AND STORAGE:

A. Deliver carpet in manufacturer’s original wrappings and packages clearly labeled with manufacturer’s brand name, size, dye lot number and related information. Transport carpet to job site in a manner that prevents damage and distortion that might render it unusable. When bending or folding is unavoidable for delivery purposes, unfold carpet and lay flat immediately.

B. Deliver adhesives in containers clearly labeled with manufacturer’s brand name, number, installation instructions, safety instructions and flash points.

C. Store in a clean, dry, well-ventilated area, protected from damage and soiling. Before installation, acclimate carpet to the atmospheric conditions of the areas in which it will be installed for 2 days prior to installation.

1.6 ENVIRONMENTAL REQUIREMENTS:

A. Maintain areas in which carpeting is to be installed at a temperature between 18 - 35 degrees C (65 - 95 degrees F) with a maximum relative humidity of 65 percent for two (2) days before installation, during installation and for three (3) days after installation.

B. Minimum Substrate Surface Temperature: 18 degrees C (65 degrees F) at time of installation.

C. Three (3) days after installation, maintain minimum temperature of 10 degrees C (50 degrees F) for the duration of the contract.

1.7 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their carpet for a minimum of ten (10) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.8 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American National Standards Institute (ANSI):

ANSI/NSF 140-10 .....Sustainable Carpet Assessment Standard

C. American Association of Textile Chemists and Colorists (AATCC):

16-04 .....Colorfastness to Light

134-11 .....Electric Static Propensity of Carpets

165-08 .....Colorfastness to Crocking: Textile Floor Coverings-AATCC Crockmeter Method

174-11 .....Antimicrobial Activity Assessment of New Carpets

D. ASTM International (ASTM):

D1335-12 .....Tuft Bind of Pile Yarn Floor Coverings

D3278-96(R2011) .....Flash Point of Liquids by Small Scale Closed-Cup Apparatus

D5116-10 .....Determinations of Organic Emissions from Indoor Materials/Products

D5252-11 .....Operation of the Hexapod Tumble Drum Tester

D5417-11 .....Operation of the Vettermann Drum Tester

E648-14c .....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

E. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

F. The Carpet and Rug Institute (CRI):

CIS .....Carpet Installation Standard

G. International Standards and Training Alliance (INSTALL)

H. International Organization for Standardization (ISO):

2551-81 .....Machine-Made Textile Floor Coverings

I. U.S. Consumer Product and Safety Commission (CPSC):

16 CFR 1630 .....Surface Flammability of Carpets and Rugs

PART 2 - PRODUCTS

2.1 CARPET:

A. Physical Characteristics:

1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Type:
   a. Carpet Construction: Multi-Level Pattern Loop
   b. Carpet Type: Modular tile (18 x 36 inch) with 0.15 percent growth/shrink rate in accordance with ISO 2551.
   c. Pile Thickness: 0.069 in . Must conform to ADA requirements.
   d. Total Thickness: 0.208 in.
   e. Pile Fiber: Eco Solution Q Nylon or equivalent.
3. Static Control: Provide static control to permanently regulate static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Backing Materials: Provide backing for release adhesive for modular tile installations. For healthcare installations, provide impervious moisture backing that is 100 percent PVC free.
   a. Primary Backing/Backcoating: Non-woven, synthetic.
   b. Provide Secondary Backing: Equal to Philadelphia Commercial EcoWorx Backing System.
5. Appearance Retention Rating (ARR): Carpet to be tested and have the minimum 3.5 – 4.0 severe ARR when tested in accordance with either the ASTM D5252 (Hexapod) or ASTM D5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified in the ASTM standard.
6. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
7. Colorfastness to Light (AATCC 16, Option 3): Color change between the exposed and unexposed carpet areas equivalent to a minimum of Grade 4 on the Gray Scale for Color Change after an exposure of 40 AFU (AATCC fading units) for all specified colors.

8. Delamination Strength: Minimum of 440 N/m (2.5 lb./inch) between secondary backing.
9. Flammability and Critical Radiant Flux Requirements:
   a. Comply with 16 CFR 1630.
   b. Test Carpet in accordance with ASTM E648.
   c. Class I: Minimum critical radiant flux of 0.45 watts per square centimeter (2.9 watts per square inch).
   d. Carpet in corridors, exits and Medical Facilities to be Class I.
10. Average Pile Yarn Density (APYD):
   a. Corridors, lobbies, entrances, common areas or multipurpose rooms, open offices, waiting areas and dining areas: Minimum APYD 6000.
   b. Other areas: Minimum APYD 4000.

2.2 ADHESIVE AND CONCRETE PRIMER:

A. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 60 degrees C (140 degrees F) in accordance with ASTM D3278. Materials are to have a VOC maximum of 50 g/L when calculated according to 40 CFR 59, (EPA Method 24).

2.3 EDGE STRIPS (MOLDING):

A. Vinyl Edge Strip:
   1. Beveled floor flange minimum 50 mm (2 inches) wide.
   2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.
   3. Color as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

A. Contractor to prepare and test surfaces to receive carpet and adhesives as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

3.2 GENERAL INSTALLATION:

A. Isolate area of installation from rest of building.

B. Perform all work by manufacturer’s approved installers. Conduct installation in accordance with the manufacturer’s printed instructions and CRI CIS.

C. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions.
D. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least three (3) days following installation.
E. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation.
F. Complete other work which would damage the carpet prior to installation of carpet.
G. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
H. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations. Bind or seal cut edge of sheet carpet. Use additional adhesive to secure carpets around pipes and other vertical projections.

3.3 MODULAR TILE INSTALLATION:

A. Install per CRI CIS, Adhesive Application.
B. Lay carpet modules with pile in same direction unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
C. Install carpet modules so that cleaning methods and solutions do not cause dislocation of modules.
D. Lay carpet modules uniformly to provide tight flush joints free from movement when subject to traffic.

3.4 EDGE STRIPS INSTALLATION

A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.
B. Anchor vinyl edge strip to floor with adhesive. Apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.5 PROTECTION AND CLEANING:

A. Once a carpet installation is complete, clean up scrap materials and debris, and vacuum the area, using manufacturer-approved equipment. Inspect seams carefully for evenness and protruding backing yarns, and inspect the perimeter of the installation for an acceptable finished appearance.
B. Protect installed carpet if furniture is being moved, by laying plywood, fiberboard or porous non-staining sheeting material for minimum time practical. Based on manufacturer guidelines, protect

carpet from rolling or foot traffic. Protect against other materials or renovation or construction activities, including dust, debris, paint, contractor traffic, until it is ready for its final use.

C. Do not move furniture or equipment on unprotected carpeted surfaces.

D. Just before final acceptance of work remove protection and vacuum carpet clean.

3.6 OWNER INVENTORY

A. Provide one case of each product to owner or 10% of total installed product (whichever is less.)

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SECTION 09 72 16
VINYL-COATED FABRIC WALL COVERINGS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Section specifies vinyl coated fabric wall covering and installation.

1.2 RELATED WORK:

A. Colors, patterns, and types of wall coverings: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

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

B. Samples:

1. Each type and pattern as specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Size: Full width of mill run not less than 450 mm (18 inches) in length.

C. Manufacturer's Literature and Data:

1. Wall covering primer and adhesive.
2. Installation instructions.
3. Maintenance instructions, including recommended materials and methods for maintaining wall covering with precautions in use of cleaning material.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver in original unopened containers bearing the manufacturer's name, brand name, and product designation.

B. Store in accordance with manufacturer's instructions.

C. Handle to prevent damage to material.

1.5 APPLICABLE PUBLICATIONS:

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

B. ASTM International (ASTM):

E84-14 .....Surface Burning Characteristics of Building Materials

G21-13 .....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

D. Wallcovering Association (WA):

W-101-13 .....Quality Standard Polymer Coated Fabric Wallcoverings

PART 2 - PRODUCTS

2.1 VINYL COATED FABRIC WALL COVERING:

A. Comply with WA W-101.

B. Fungi Resistance: ASTM G21, rating of zero (0).

C. Factory-applied clear delustered polyvinyl-fluoride (PVF) coating:

1. Minimum 0.0125 mm (1/2 mil) thickness.
2. Do not include PVF coating weight in minimum total weight.
3. Fire hazard classification with PVF coating: Class A unless specified otherwise.

D. Type II (Medium Duty).

2.2 PRIMER AND ADHESIVE:

A. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

B. Vermin, mildew resistant and germicidal inhibiting type recommended by wall covering manufacturer for use on substrate to receive wall covering.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Temperatures:

1. Do not perform work until surfaces and materials have been maintained at minimum of 16 degrees C (60 degrees F) for three (3) days before work begins.
2. Maintain minimum temperatures of 16 degrees C (60 degrees F) until adhesives are dried or cured.

B. Lighting:

1. Do not proceed unless a minimum lighting level of 15 candela per 0.09 square meter (15 candelas per square foot) is provided.
2. Measure light level at mid-height of wall.

C. Ventilation: Provide continuous ventilation as required to rid the spaces in which the wall coverings are being installed of volatile compounds given off by the wall coverings, sealers and adhesives and as recommended by the product manufacturer for full drying or curing.

D. Protect other surfaces from damage resulting from installation of wall coverings. Provide drop cloths, shields and protective equipment to prevent primers, adhesives or wall covering from fouling adjacent surfaces and in particular, storage and preparation areas.

E. Store flammable rubbish, waste, cloths and materials which may constitute a fire hazard, in closed metal containers. Daily remove and properly dispose of flammable wastes from the site.

3.2 SURFACE CONDITION AND PREPARATION:

A. Inspect surfaces to receive wall coverings to assure that:

1. Patches and repairs to substrates are completed.
2. Surfaces are clean, smooth and prime painted.

B. Surfaces to receive wall covering are to be dry.

C. Do not proceed until discovered defects have been corrected by other trades and surfaces are ready to receive wall covering.

D. Carefully remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings, prior to starting work and store items for reinstallation.

3.3 APPLICATION OF ADHESIVE:

A. Mix and apply adhesives in accordance with manufacturer's directions.

B. Prevent adhesive from getting on face of wall covering.

C. Apply adhesive to wall covering back.

3.4 INSTALLATION:

A. Use wall covering of same batch or run in each area. Use fabric rolls in consecutive numerical sequence of manufacture.

B. Install material completely adhered, smooth, clean, without wrinkles, air pockets, gaps or overlaps.

C. Extend wall covering continuous behind non-built-in casework and other items which are not bolted to the walls.

D. Install wall covering before installation of resilient base. Extend wall covering not more than 6 mm (1/4 inch) below top of resilient base.

E. Install wall covering panels consecutively in order in which they are cut from the roll including filling spaces above or below windows, doors, or similar penetrations.

F. Do not install horizontal seams.

G. Except on match patterns, hang fabric by reversing alternate strips, except as recommended by the manufacturer.

H. Cutting:

1. Cut on a worktable with a straight edge.
2. Joints or seams that are not cut clean are unacceptable.
3. Trim additional selvage to achieve a color and pattern match at seams. Overlapped seams are not allowed.
4. Double cut seams on wall unless specified.
5. If double cutting on the wall is necessary, place a three-inch strip of Type I wall covering under pasted edge.
   a. Do not cut into wall surface.
   b. After cutting, remove strip and excess adhesive from seam before proceeding to next seam.
   c. Smooth down seam in adhesive for tight bond and joint.

I. Trim strip-matched patterns which are not factory pre-trimmed.

J. Inside Corners:
1. Wrap wall covering around corners.
2. Do not seam within 50 mm (2 inches) of inside corners.
3. Double cut seams.

K. Outside Corners:
1. Wrap wall covering around corners.
2. Do not seam within 152 mm (6 inches) of outside corners.
3. Double cut seams.

3.5 PATCHING:

A. Replace surface damaged wall covering in a space as specified for new work:
1. Replace full height of surface.
2. Replace from break in plane to break in plane when same batch or run is not used.
3. Double cut seams.
4. Adjoining differential colors from separate batches or runs is not acceptable.

B. Correct loose or raised seams with adhesives to lay flat with tight bonded joint as specified for new work.

3.6 CLEANING AND INSTALLING TEMPORARY REMOVED ITEMS:

A. Remove adhesive from wall covering as work proceeds.

B. Remove adhesives where spilled, splashed or splattered on wall coverings or adjacent surfaces in a manner not to damage surface from which it is removed.

C. Upon completion of work, leave wall covering free of dirt or soil.

D. Remove all debris associated with wall covering installation.

E. Reinstall previously removed electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings.

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SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, but not limited to, the following:

1. Prime coats which may be applied in shop under other sections.
2. Prime painting unprimed surfaces to be painted under this Section.
3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
4. Painting ferrous metal (except stainless steel) exposed to view.
5. Painting gypsum drywall exposed to view.
6. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
7. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
8. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
9. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 RELATED WORK:

A. Activity Hazard Analysis: Section 01 35 26, SAFETY REQUIREMENTS.

B. Lead Paint Removal: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.

C. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS; Division 21 – FIRE SUPPRESSION; Division 22 - PLUMBING; Division 23 – HEATING; VENTILATION AND AIR-CONDITIONING; Division 26 - ELECTRICAL; Division 27 - COMMUNICATIONS; and Division 28 – ELECTRONIC SAFETY AND SECURITY sections.

D. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

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

B. Manufacturer's Literature and Data:

1. Before work is started, submit manufacturer's literature and technical data.

C. Sample Panels:

1. After painters' materials have been approved and before work is started, submit sample panels showing each type of finish and color specified.
2. Panels to Show Color: Composition board, 100 x 250 mm (4 x 10 inch).
3. Attach labels to panel stating the following:
   a. Manufacturers name and product number of paints used.
   b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
   c. Product type, color and gloss level.
   d. VA project title, VA project number, and VA contract number.
4. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.

1.4 DELIVERY AND STORAGE:

A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
2. Product type.
3. Batch number.
4. Instructions for use.
5. Safety precautions.

B. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

C. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

1.5 QUALITY ASSURANCE:

A. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total

coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

1.6 REGULATORY REQUIREMENTS:

A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.

1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
2. Lead-Based Paint:
   a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
   b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
   c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
   d. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
3. Asbestos: Provide materials that do not contain asbestos.
4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
6. Use high performance acrylic paints in place of alkyd paints.

1.7 SAFETY AND HEALTH

A. Apply paint materials using safety methods and equipment in accordance with the following:

1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS.

The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.

C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
2. 29 CFR 1910.1000.
3. ACHIH-BKLT and ACGHI-DOC, threshold limit values.

1.8 APPLICABLE PUBLICATIONS:

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

B. American Conference of Governmental Industrial Hygienists (ACGIH):

ACGIH TLV-BKLT-2012 ....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

ACGIH TLV-DOC-2012 .....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

C. ASME International (ASME):

A13.1-07(R2013) .....Scheme for the Identification of Piping Systems

D. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

E. Commercial Item Description (CID):

A-A-1272A .....Plaster Gypsum (Spackling Compound)

F. Federal Specifications (Fed Spec):

TT-P-1411A .....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

G. Master Painters Institute (MPI):

1 .....Aluminum Paint

9 .....Exterior Alkyd Enamel MPI Gloss Level 6

18 .....Organic Zinc Rich Primer

22 .....Aluminum Paint, High Heat (up to 590% - 1100F)

47 .....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
94 .....Exterior Alkyd, Semi-Gloss
95 .....Fast Drying Metal Primer

134 .....Galvanized Water Based Primer
135 .....Non-Cementitious Galvanized Primer
141 .....Interior High Performance Latex (SG) MPI Gloss Level 5
147.....Latex Interior Institutional Low Odor/VOC, Semi-Gloss, MPI Gloss Level 5
149.....Primer Sealer Interior Institutional Low Odor/VOC
153.....Light Industrial Coating, Interior, Water-Based, Semi-Gloss, MPI Gloss Level 5

H. Society for Protective Coatings (SSPC):
SSPC SP 1-82(R2004) ....Solvent Cleaning
SSPC SP 2-82(R2004) ....Hand Tool Cleaning
SSPC SP 3-28(R2004) ....Power Tool Cleaning
SSPC SP 10/NACE No.2 ...Near-White Blast Cleaning
SSPC PA Guide 10 .....Guide to Safety and Health Requirements

I. U.S. National Archives and Records Administration (NARA):
29 CFR 1910.1000 .....Air Contaminants

J. Underwriter’s Laboratory (UL)

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer’s technical data sheets for specified coatings and solvents.

2.2 PAINT PROPERTIES:

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.

D. VOC Content: For field applications that are inside the weatherproofing system, paints and coating to comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
   1. Non-flat Paints and Coatings: 150 g/L.
   2. Primers, Sealers, and Undercoaters: 200 g/L.

E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

2.3 PLASTIC TAPE:

A. Pigmented vinyl plastic film in colors as specified.

B. Pressure sensitive adhesive back.

C. Widths to match existing.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
   1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
   2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.

B. Atmospheric and Surface Conditions:
   1. Do not apply coating when air or substrate conditions are:
      a. Less than 3 degrees C (5 degrees F) above dew point.
      b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.
      c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
   2. Maintain interior temperatures until paint dries hard.
   3. Do no exterior painting when it is windy and dusty.
   4. Do not paint in direct sunlight or on surfaces that the sun will warm.
   5. Apply only on clean, dry and frost free surfaces except as follows:

a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces only when allowed by manufacturer's printed instructions.
b. Concrete and masonry when permitted by manufacturer's recommendations, dampen surfaces to which water thinned acrylic and cementitious paints are applied with a fine mist of water on hot dry days to prevent excessive suction and to cool surface.

3.2 INSPECTION:

A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

A. Application may be by brush or roller. Spray application only upon acceptance from the COR in writing.
B. Furnish to the COR a painting schedule indicating when the respective coats of paint for the various areas and surfaces will be completed. This schedule is to be kept current as the job progresses.
C. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.
D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.
E. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
F. Materials are to be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
G. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform

finish, color, appearance and coverage, at no additional cost to the Government.

H. All coats are to be dry to manufacturer's recommendations before applying succeeding coats.

3.4 SURFACE PREPARATION:

A. General:

1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
2. See other sections of specifications for specified surface conditions and prime coat.
3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   a. Gypsum Board: 12 percent.

B. Ferrous Metals:

1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish

with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.

a. Fill flat head countersunk screws used for permanent anchors.

b. Do not fill screws of item intended for removal such as glazing beads.

4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.

5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

C. Zinc-Coated (Galvanized) Metal, Aluminum, Copper and Copper Alloys Surfaces Specified Painted:

1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).

2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer) depending on finish coat compatibility.

D. Gypsum Board:

1. Remove efflorescence, loose and chalking plaster or finishing materials.

2. Remove dust, dirt, and other deterrents to paint adhesion.

3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.5 PAINT PREPARATION:

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.

B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.

C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.

D. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 APPLICATION:

A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.

B. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.

C. Apply each coat evenly and cover substrate completely.

D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.

E. Apply by brush or roller only.

F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.7 PRIME PAINTING:

A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.

D. Metals:

1. Steel and iron: MPI 95 (Fast Drying Metal Primer).
2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer).
3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
4. Terne Metal: MPI 95 (Fast Drying Metal Primer).
5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel).
7. Asphalt coated metal: MPI 1 (Aluminum Paint).
8. Metal over 94 degrees C (201 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating).

E. Gypsum Board:

1. Surfaces scheduled to have MPI 141 Interior High-Performance Latex (SG) MPI Gloss Level 5; and MPI 147 Latex Interior Institutional Low

Odor/VOC, Semi-Gloss, MPI Gloss Level 5 finish: Use MPI 149 Primer Sealer Interior Institutional Low Odor/VOC.

2. Surfaces scheduled to receive vinyl coated fabric wall covering: MPI 149 Primer Sealer Interior Institutional Low Odor/VOC.

3.8 INTERIOR FINISHES:

A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal:
   a. Apply two (2) coats of MPI 153 Light Industrial Coating, Interior, Water-Based, Semi-Gloss, MPI Gloss Level 5

C. Gypsum Board:

1. Two (2) coats of MPI 141 Interior High-Performance Latex (SG) MPI Gloss Level 5; or MPI 147 Latex Interior Institutional Low Odor/VOC, Semi-Gloss, MPI Gloss Level 5. See Section 09 06 00, SCHEDULE FOR FINISHES.

3.9 REFINISHING EXISTING PAINTED SURFACES:

A. Clean, patch and repair existing surfaces as specified under “Surface Preparation”. No “telegraphing” of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, sand smooth and re-finish until surface meets with COR’s approval.

B. Remove and reinstall items as specified under “General Workmanship Requirements”.

C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.

D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

G. Sand or dull glossy surfaces prior to painting.

H. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.10 PAINT COLOR:

A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. For additional requirements regarding color see Articles, "REFINISHING EXISTING PAINTED SURFACE" and "MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE".

C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.11 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE:

A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.

B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified below.

C. Paint various systems specified in Division 02 – EXISTING CONDITIONS, Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY.

D. Paint exposed sprinkler lines red to match existing.

E. Paint after tests have been completed.

F. Omit prime coat from factory prime-coated items.

G. Color:

1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
   a. Gray: Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.

b. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
c. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.

H. Apply paint systems on properly prepared and primed surface as follows:
1. Interior Locations:
a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) to following items:
1) Metal under 94 degrees C (201 degrees F) of items such as bare piping, fittings, hangers and supports.
2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
b. Paint electrical conduits containing cables rated 600 volts or more using two (2) coats of MPI 94 (Exterior Alkyd, Semi-gloss) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

3.12 IDENTITY PAINTING SCHEDULE:

A. Identify designated service in new buildings or projects with extensive remodeling in accordance with ASME A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels. For existing spaces where work is minor match existing.
1. Legend may be identified using snap-on coil plastic markers or by paint stencil applications.
2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12.2 M (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
3. Locate Legends clearly visible from operating position.
4. Use arrow to indicate direction of flow using black stencil paint.
5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert

working pressure shown on construction documents where asterisk appears for High, Medium, and Low Pressure designations as follows:

a. High Pressure - 414 kPa (60 psig) and above.

b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).

c. Low Pressure - 103 kPa (14 psig) and below.

d. Add Fuel oil grade numbers.

6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off		Green	White	Blow-off
Boiler Feedwater		Green	White	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Blue	White	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Green	White	H.P. _____*
High Pressure Condensate Return		Green	White	H.P. Ret ____*
Medium Pressure Steam		Green	White	M. P. Stm ____*
Medium Pressure Condensate Return		Green	White	M.P. Ret _____*
Low Pressure Steam		Green	White	L.P. Stm _____*
Low Pressure Condensate Return		Green	White	L.P. Ret _____*
High Temperature Water Supply		Green	White	H. Temp Wtr Sup

High Temperature Water				
Return		Green	White	H. Temp Wtr Ret
Hot Water Heating Supply		Green	White	H. W. Htg Sup
Hot Water Heating Return		Green	White	H. W. Htg Ret
Gravity Condensate Return		Green	White	Gravity Cond Ret
Pumped Condensate Return		Green	White	Pumped Cond Ret
Vacuum Condensate Return		Green	White	Vac Cond Ret
Fuel Oil - Grade	Brown	White	Fuel Oil-Grade	
(Diesel Fuel included under Fuel Oil)				
Boiler Water Sampling		Green	White	Sample
Chemical Feed		Green	White	Chem Feed
Continuous Blow-Down		Green	White	Cont. B D
Pumped Condensate		Green	White	Pump Cond
Pump Recirculating		Green	White	Pump-Recirc.
Vent Line		Green	White	Vent
Alkali		Orange	Black	Alk
Bleach		Orange	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste

Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Orange	Black	Acid Waste
Vent		Orange	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6096 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000, 15000, 25000.
8. See Sections for methods of identification, legends, and abbreviations of the following:
   a. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
   b. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS / Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS /

B. Fire and Smoke Partitions:
1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE BARRIER" or "FIRE BARRIER" as applicable.
3. Locate not more than 6096 mm (20 feet) on center on corridor sides of partitions, and with a least one (1) message per room on room side of partition.
4. Use semi-gloss paint of color that contrasts with color of substrate.

3.13 PROTECTION CLEAN UP, AND TOUCH-UP:

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

- - - E N D - - -

SECTION 10 21 23
CUBICLE CURTAIN TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cubicle curtain track.

1.2 RELATED WORK

A. Acoustical ceiling tile and suspension systems Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

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

B. Samples:

1. 305 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

D. Manufacturer's Literature and Data:

1. Cubicle curtain track.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location. Store so as to not bend or warp the tracks.

C. Do not open packages until contents are needed for installation unless verification inspection is required.

1.5 WARRANTY

A. Construction Warranty: Cubicle curtain tracks are subject to the terms of the Article “Warranty of Construction,” FAR clause 52.246-21.

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):

B221-14 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-11 .....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series .....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS

A. Basis for Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Channel Tracks (Surface Mounted Type): Heavy-duty, extruded, PVC vinyl track with smooth inside raceway for curtain carriers.

C. Curtain Carriers: Nylon carriers, with nylon wheels.

1. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain.
2. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel.
3. Provide 2.2 carriers for every 305 mm (1 foot) of each section of each track length, plus one (1) additional carrier.

D. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.

E. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.

F. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Provide operating mechanism shall be removable with common tools.

2.2 FASTENERS

A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.

B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized.

C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel.

1. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

2.3 FINISHES

A. Heavy-duty extruded rigid vinyl.

B. Chrome/Nickel Plating: Satin or polished finish, ASTM B546, minimum thickness of chromium plate as follows:

1. 0.005 mm (0.2 mil) on copper alloys.
2. 0.01 mm (0.4 mil) on steel.

C. Stainless Steel: No. 4 in accordance with NAAMM AMP 500.

2.4 FABRICATION

A. Provide Tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4877 mm (16 feet) without joints. Form corner bend on a 305 mm (12 inch) radius.

B. Provide steel anchor plates, supports, and anchors for securing components to building construction.

C. Form flat surface without distortion.

D. Shop-assemble components and package complete with anchors and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install tracks after finish painting and ceiling finishing operations are complete.

B. Install track level and hangers plumb and securely anchor to the ceiling to form a rigid installation.

C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 610 mm (24 inches) on center.

D. Fasten end stop caps to prevent them from being forced out by the striking weight of carriers.

E. Remove damaged or defective components and replace with new components or repair to the original condition.

F. Install track rigid, plumb, level and true, and securely anchored to the overhead construction.

G. Verify that carrier units operate smoothly and easily over the full range of travel.

- - - E N D - - -

SECTION 10 21 23.13
CUBICLE CURTAINS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies cubicle curtains.

1.2 RELATED WORK:

A. Cubicle curtain tracks: Section 10 21 23.16 CUBICLE CURTAIN TRACKS

B. Color and pattern: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

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

B. Samples:

1. Fabric: Swatch to be a minimum 12”-square and display a full pattern repeat where applicable. Clearly label if fabric is intended to be railroaded.
2. Mesh Top: Not less than 4 inches square, demonstrating manufacturer’s standard hemming around mesh perimeter with matching fabric.

C. Manufacturer's Literature and Data:

1. Cubicle curtain fabric.
2. Mesh top.

D. Maintenance Data:

1. Methods for maintaining and cleaning curtains, including instructions on laundering and precautions regarding use of cleaning solvents and methods.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Do not deliver or install curtains until construction within spaces are substantially complete.

B. Label curtains according to schedule.

C. Store products in manufacturer's unopened packaging until ready for installation.

1.5 WARRANTY:

A. Construction Warranty: Cubicle curtains are subject to the terms of the Article “Warranty of Construction,” FAR clause 52.246-21.

PART 2 - PRODUCTS

2.1 CUBICLE CURTAINS:

A. Curtain: The standard cubicle curtain consists of an upper mesh panel sewn permanently onto a lower fabric panel to provide privacy to the patient.

B. Meets NFPA 13 Sprinkler System Code.

C. Meets requirement of NFPA Bulletin 701 (test 1, small scale).

D. Fabric Panel:

1. Material: 100% polyester.
2. 1” triple-folded bottom and side hems with lockstitch.

E. Mesh header:

1. Material: 100% polyester.
2. 1” triple-folded header for grommet reinforcement.
3. 20” finished height minimum.

F. Grommets: #10 nickel-plated grommets, spaced 6” on center.

G. Size: Track length plus 15% (rounded to nearest foot) for fullness; Full height from track system to 10”-16” above finished floor (AFF).

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install curtains on carriers.

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SECTION 10 22 26.13
ACCORDION FOLDING PARTITIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies manually operated, top supported accordion-type folding partitions for wall to wall room division.

1.2 RELATED WORK

A. Steel Supporting Members or Hanger Rods: Section 05 50 00, METAL FABRICATIONS.

B. Wood Trim: Section 06 20 00, FINISH CARPENTRY.

C. Color and Texture of Vinyl-Coated Fabric Wallcovering and Color of Finish on Steel: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 PERFORMANCE REQUIREMENTS

A. The partitions are to provide a complete closure of opening when fully extended and latched.

B. Provide vinyl-coated fabric wallcovering and lining with flame spread rating of 25 or less, fuel contribution rating of 15 or less, and smoke generation of 50 or less when tested in accordance with ASTM E84. Complete assembly must also meet or surpass the requirements of NFPA 101 and UL 10B.

1.4 SUBMITTALS

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

B. Shop Drawings:

Folding partition, each type, including methods of installation

C. Samples: Vinyl-Coated Fabric Wallcovering, 152 mm (6 inch) square.

D. Manufacturers' Literature and Data:

1. Folding partition each type.

E. Test Reports:

1. Fire test response characteristics.

F. Manufacturer's Certificates:

Certificate certifying that the partition referred to in the test reports conforms to specification requirements, and that the partitions to be provided for the project are the same in all characteristics as that tested in the laboratory.

G. Manufacturer’s qualifications.

H. Installer’s qualifications.

I. Manufacturer’s warranty.

1.5 WARRANTY

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

B. Manufacturer Warranty: Manufacturer shall warranty their accordion folding partitions for a minimum of two (2) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

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):

A1008/A1008M-13 .....Steel, sheet, Cold Rolled, Structural, High Strength Carbon, Low Alloy with Improved Formability

B221-14 .....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13 .....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

D751-06(R2011) .....Test Methods for Coated Fabrics

E84-14 .....Surface Burning Characteristics of Building Materials

E90-09 .....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

C. National Fire Protection Association (NFPA):

70-14 .....National Electrical Code

101-15(R2014) .....Life Safety Code

286-15 .....Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

D. Underwriters Laboratories Inc. (UL):

10B-10(R2009) .....Fire Tests of Door Assemblies

PART 2 - PRODUCTS

2.1 PRODUCTS – GENERAL:

A. Basis of Design: Equal to Modernfold, Model 800M.

2.2 MATERIALS

A. Facing Materials:

1. General: Provide facing materials with appropriate backing that comply with indicated fire-test response characteristics, and are factory attached to accordion folding partitions with concealed fasteners. Covering must conform to the requirements of ASTM D751 and NFPA 286.
2. Vinyl Coated Fabric: Manufacturer's standard mildew resistant, washable, vinyl coated fabric wall covering, complying with CFFA-W-101-D, for Type II Class A.

B. Sheet Steel:
1. ASTM A1008/A1008M, cold rolled, commercial quality for partition tracks, lead and jamb posts.
2. The cast or heat analysis report mentioned in the ASTM is not required.

D. Aluminum Extrusions: ASTM B221M (B221), Alloy 3003.

2.3 FABRICATION

A. Track:
1. Steel.
2. Shall be of a continuous "C" channel shaped track, connected to the structural support.

B. Construction:
1. Shall consist of steel hinge plates welded to 3/16-inch (5mm) diameter vertical steel rods, with a single row of plates at the bottom and top with intermediate rows at approximately 42-inch (1067mm) on center. Partitions 13'-0" (3048mm) high or over have a double row of hinge plates at the top. A high tensile alloy steel trolley yoke, functioning as a hinge pin at required intervals, supports the frame assembly.

C. Suspension System:
1. Track and trolley sizes matched to the size of the partition.
2. Carriers: The accordion folding partition shall be suspended from the track by two-wheel intermediate and four-wheel lead trolley assemblies.

D. Covering:
1. Reinforced heavy-duty vinyl with woven backing weighing not less than 30 ounces per lineal yard.

E. Hardware:
1. Grip type hand pulls shall be die-cast zinc, satin chrome finish.
2. Provide pulls and latches for all partitions.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Verify field dimensions prior to fabrication.

3.2 INSTALLATION

A. General: Comply with ASTM E557 except as otherwise required by accordion folding partition manufacturer's written installation instructions. Install accordion folding partitions level and plumb, with tight joints and uniform appearance, and free of deformation and surface and finish irregularities.

B. Install accordion folding partitions and accessories after other finishing operations, including painting, have been completed.

C. Recessed Type Installation: Install so that bottom of track is flush with ceiling.

D. Anchorage:

1. Secure ceiling tracks to structural steel supports or other support system as shown on construction documents with 13 mm (1/2 inch) through-bolts or anchor bolts as appropriate.
2. Provide bolts near each end of track and at intermediate points not more than 609 mm (2 feet) on centers.

E. Adjustment:

1. Provide shims or other means as required to make partitions close openings fully and completely.
2. Install partitions so that leading edges fit tight to jambs or opposing partition leading edge for full height of partition.
3. Make all necessary adjustments to assure that hardware functions properly.

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SECTION 10 25 13
PATIENT BED SERVICE WALLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation and connection of the horizontal Patient Bed Service Wall (PBSW).

1.2 RELATED WORK

A. Section 09 06 00, SCHEDULE FOR FINISHES: Color and finishes of the PBSW units.

B. Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.

C. Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES: Requirements for air, oxygen and vacuum outlets in the PBSW.

D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Minimum requirements, test standards, qualifications products and services, manufactured products, and materials/equipment protection for electrical installations.

E. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.

F. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.

G. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Raceways and outlet boxes for wiring.

H. Section 26 27 26, WIRING DEVICES: Wiring devices to be installed in the PBSW units.

I. Section 26 51 00, INTERIOR LIGHTING: Lighting fixture requirements when installed in or connected to the PBSW units.

J. Section 27 52 23, NURSE CALL/CODE BLUE SYSTEMS: Nurse Call and Code One requirements for installation in the PBSW units.

1.3 SUBMITTALS

A. Obtain Government approval for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval is not permitted.

B. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit the following:

1. Shop Drawings:
   a. Include sufficient information, clearly presented, to determine compliance with construction documents.
   b. Include electrical ratings, dimensions, mounting details, front view, side view, equipment and device arrangement, wiring diagrams, material, and connection diagrams.
   c. Submit configuration drawings showing devices, including nurse call, medical gases, electrical receptacles and switches. The Contracting Officer Representative (COR) will convey by return of submittal the desired configuration of each style of PBSW system. Limit the quantity and types of devices allowed for each style of unit to the quantity and types of devices specified for that style.
2. Manufacturer's Literature and Product Data: Submit descriptive literature, catalog cuts, test reports, certifications, samples, and other data necessary for the COR to ascertain that the proposed materials and equipment comply with construction documentation requirements. Catalog cuts submitted for approval are to be legible and clearly identify specific materials and equipment being submitted.
3. Manufacturer's qualifications.
4. Product qualifications.
5. Service qualifications.
6. Operation and Maintenance Manuals: Two (2) weeks prior to the final inspection, deliver four (4) copies of the following to the COR.
   a. Complete maintenance and operating manuals including wiring diagrams, technical data sheets, and information for ordering replacement parts:
      1) Include complete "As installed" diagrams which indicate all items of equipment, their interconnecting wiring and interconnecting piping.
      2) Include complete diagrams of the internal wiring for each of the items of equipment, including "As installed" revisions of the diagrams.
      3) Identify terminals on the wiring diagrams to facilitate installation, maintenance and operation.
7. Certifications: Two (2) weeks prior to the final inspection, deliver four (4) copies of the following certifications to the COR:

a. Certification by the manufacturer that the equipment conforms to the requirements of the construction documents.
b. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested in accordance with the manufacturer's recommendations.

1.4 WARRANTY

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

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in text by the basic designation only.

B. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

C. National Fire Protection Association (NFPA):

70-17 .....National Electrical Code (NEC)

99-18 .....Health Care Facilities

D. National Electrical Manufacturer's Association (NEMA):

WD-6-16 .....Wiring Devices - Dimensional

E. Underwriters Laboratories, Inc. (UL): Certification Directory Listing for Prefabricated Medical Headwalls

PART 2 - PRODUCTS

2.1 PBSW SYSTEMS

A. Provide PBSW's that are UL certification directory listed.

B. Provide units consisting of a structural framework, removable panels and removable equipment console units which are factory assembled to house all permanent bedside services. Services include but are not limited to fixtures, grounding jacks, power outlets, telephone outlets, nurses call patient station, medical gas outlet(s), television remote control unit, and other fittings or devices.

C. Conform to the following:

1. Applicable requirements in NFPA 70 and NFPA 99.
2. Assembly and all components are to be UL listed or labeled.
3. Adhesives where used are to have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

D. Coordinate the mounting space provisions for the nurse call equipment with Section 27 52 23, NURSE CALL/CODE BLUE SYSTEMS.

E. Compressed Air, Oxygen and Vacuum System Equipment: Furnish, install and test the equipment in accordance with the construction documents and Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.

1. Provide fixed medical gas outlets that are permanently installed in one (1) location and cannot move without special tools and shutting off the medical gas involved.
   a. All hoses are to be accessible at all times. Provide bars or other restraining devices to control exposed hoses. A panel may cover the hoses provided it can be easily removed without the use of special tools for hose inspection.
   b. Relocatable type:
      1) Relocatable (snap-in) without the use of tools to any one of several different fixed locations.
      2) Appropriate relocatable adapter can be used to access available gases from each fixed location.
      3) Cover all unused locations with a blank (no gas) adapter plate.

F. Electrical receptacles and switches to comply with the requirements in Section 26 27 26, WIRING DEVICES; grounding in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS; and internal wiring in Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

G. Styles:

1. Style A1: A single bed PBSW unit consisting of two (2) vertical units, one on each side of a third center bed unit.
   a. Provide horizontal units that consists of a minimum of three (3) zones.
      1) Provide a middle zone for power, nurse call, and medical gases.
      2) Provide bottom zone for power and data and bed power.
      3) Provide vertical chase connecting zones to above ceiling junction boxes and gas connection points.
   b. Provide oxygen gas outlet(s): Two (2) each fixed or one (1) each movable.

c. Provide air outlet (s): Two (2) each fixed or one (1) each moveable.
d. Provide vacuum outlet(s): Two (2) each fixed or two (2) each movable.
e. Provide emergency power outlets: Five (5) each NEMA 20R single receptacles, self-illuminated red with stainless steel or anodized aluminum cover plate, engraved "EMERGENCY POWER" with minimum 6 mm (1/4 inch) red filled letters.
f. Provide normal power outlets: Three (3) each NEMA 20R single white receptacles; one (1) of which is for the bed motor. Provide stainless steel or anodized aluminum cover plates.
g. Provide Nurses Call audio-visual single bed station.
h. Provide tele-cart jack.
i. Provide auxiliary light 6 to 7 watts, with hood and switch. Mount both on a stainless steel or an anodized aluminum face plate installed in a single gang box.
j. Provide a switch for the overhead/exam light.
k. Provide a PBSW mounted bed light fixture. Refer to Section 26 51 00, INTERIOR LIGHTING. Power bed light through the PBSW unit.

H. PBSW: Provide with the following features:
1. Construct basic structural framework of heavy gauge extruded aluminum or minimum 1.72 mm (0.067 inch; 14 gauge) cold-rolled steel.
2. Construct unit to be self-supporting for above-the-floor, close wall mounting or a freestanding installation.
3. Drill and tap the side frame members to permit the installation of front panel devices at modular intervals at any elevation between the top and bottom.
4. Provide removable front panels:
a. Construct panel of the following materials:
1) Fire retarding core material surfaced with a high pressure plastic laminated facing sheet.
2) Vinyl material heat and pressure applied over a minimum of 1.52 mm (0.060 inch) sheet aluminum back braced for rigidity and sound control.
3) Vinyl material heat and pressure applied over sheet steel minimum 1.52 mm (0.060 inch).

4) Vinyl material heat and pressure applied over sheet aluminum minimum 2.03 mm (0.080 inch).

b. Provide color and texture as specified in the Section 09 06 00, SCHEDULE FOR FINISHES.

c. Bond the panel edges with an aluminum extrusion or cold-rolled steel trim designed for mounting directly to the structural framework, thus allowing the panels to be easily removed for access to internal components and for servicing of utility connections or future modifications. Secure panels with hidden screws or other means to offer an overall finished appearance. All exposed metal surfaces or trims greater than 3.17 mm (1/8 inch) wide to be of anodized aluminum or stainless steel finished to resist abrasion and affects from hospital cleaning compounds.

5. Back Panels: Attach side and back panel made of a minimum 1.52 mm (0.060 inch) sheet steel, or equivalent strength aluminum side and back panels, with flush screws to permit close wall mounting. Finish side panels to match or compliment the front panels. Match back panel for free-standing units with the finish of the front and side panels.

6. Mount patient service components in an equipment console made up of a backbox and finish fascia.

a. Provide galvanized steel backbox with outlet gang openings on minimum 61 mm (2.4 inches) uniform centers to provide mounting supports of front panel devices. Provide removable metal barriers to separate voltage sources and to facilitate wiring between segregated devices within the same horizontal module.

b. Match finish, either anodized aluminum or stainless steel of all fascia and device face plates.

c. Fascia or face plates may be omitted for power and grounding receptacles in the consoles if the receptacles are mounted flush in the PBSW cover panel and facilities, including support members, tapped holes, and spacing are provided behind the panel for future addition or relocation of receptacles.

d. Provide smooth external surfaces having a finished appearance. Maintain adequate spacing of device plates and similar items to eliminate crevices and facilitate cleaning.

7. Provide patient services as indicated in paragraphs Styles above, the schematic wiring diagram shown on construction documents, and as follows:
   a. Electrical components: Factory assembled and prewired to a sectionalized junction box at the top of the unit in accordance with circuiting and switching arrangements shown on the construction documents. Factory assembled prewiring may be stranded in sizes AWG #10 and #12. Provide an equipotential ground bus with lugs suitable for connecting AWG #14 to AWG #6 conductors with a minimum of 48 screw-type terminals, unless otherwise shown.
   b. Receptacles: Single Hospital Grade NEMA 5-20R, unless otherwise specified.
   c. Provide medical gas components compatible with those installed elsewhere in the facility, factory assembled, manifolded and pre-piped, with medical grade copper pipe, to single point connections of each service at the top of the units.
   d. Provide nurse call services consisting of provisions for adequate space and matching face plates for the equipment and empty conduit to the sectionalized junction box at the top of the unit.
   e. Provide internal power and signal wiring in separate EMT, flexible metal conduits or approved raceway. Separate normal power circuits from emergency power circuits.
   f. Provide adequate supports for conduits and piping within the structural frame.
   g. Telephone Outlets/Jacks: Plug-in type as approved by the COR.
   h. Except for anodized aluminum and galvanized or stainless steel surfaces, clean and factory paint metal surfaces with primer and not less than two (2) coats of baked enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with NFPA 70, NFPA 99, and as shown on the construction documents.

B. Compressed Air, Oxygen and Vacuum System Equipment:
   1. Install and test the equipment and piping system in accordance with the construction documents and Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES, and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.

2. Install and make connections as required for a complete and operational PBSW system for each unit.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies wall guards, handrail/wall guard combinations, corner guards, end wall guards, rigid sheet wall protection, high impact wall covering, and fiberglass reinforced plastic (FRP) sanitary wall covering.

1.2 RELATED WORK

A. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.

B. Color and texture of aluminum and resilient material: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Manufacturer with a minimum of three (3) years’ experience in providing items of type specified.

1. Obtain wall and door protection from single manufacturer.

1.4 SUBMITTALS

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

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Handrail/Wall Guard Combinations.
2. Wall Guards.
3. Corner Guards.
4. End Wall Guards.
5. High Impact Wall Covering.
6. Rigid Sheet Wall Protection
7. Fiberglass Reinforced Plastic Sanitary Wall Covering

D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

E. Manufacturer’s warranty.

1.5 DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.

B. Protect from damage from handling and construction operations before, during and after installation.

C. Store in a dry environment of approximately 21 degrees C (70 degrees F) for at least 48 hours prior to installation.

1.6 WARRANTY

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

B. Manufacturer Warranty: Manufacturer shall warranty their wall and door protection for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. ASTM International (ASTM):

A240/A240M-14 .....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications

B221-14 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

D256-10 .....Impact Resistance of Plastics

D635-10 .....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

ASTM D3273 .....Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

ASTM D3274 .....Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation

ASTM D5319 .....Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.

ASTM D6108 .....Standard Test Method for Compressive Properties of Plastic Lumber and Shapes

ASTM D6109 .....Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastic Lumber

ASTM D6111 .....Standard Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by displacement

ASTM D6177 .....Standard Test Methods for Mechanical Fasteners in Plastic Lumber and Shapes

E84-14 .....Surface Burning Characteristics of Building Materials

C. Aluminum Association (AA):

DAF 45-09 .....Designation System for Aluminum Finishes

D. American Architectural Manufacturers Association (AAMA):

611-14 .....Anodized Architectural Aluminum

E. Code of Federal Regulation (CFR):

40 CFR 59 .....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

F. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06 .....Metal Finishes Manual

G. Underwriters Laboratories Inc. (UL):

Annual Issue .....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: A240/A240M, Type 304.

B. Aluminum Extruded: ASTM B221M (B221), Alloy 6063, Temper T5. Provide aluminum alloy used for colored anodizing coating as required to produce specified color.

C. Resilient Materials:

1. Provide resilient materials consisting of high impact resistant polyvinyl chloride and engineered PETG conforming to the following:
   a. Minimum impact resistance of 960.8 N-m/m (18 ft.-lbs./sq. inch) when tested in accordance with ASTM D256 (Izod impact, ft.-lbs. per inch notched).
   b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
   c. Rated self-extinguishing when tested in accordance with ASTM D635.
   d. Provide material labeled and tested by Underwriters Laboratories or another approved independent testing laboratory.

e. Provide integral color with colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

D. Recycled High-Density Polyethylene: In accordance with ASTM D6108, ASTM D6109, ASTM D6111, and ASTM D6177.

E. MDF Board: No added urea formaldehyde.

F. Fiberglass Reinforced Plastic (FRP): Class 1A Fire Resistance; ASTM D5319; mold and mildew resistant per ASTM D3273 and D3274.

2.2 CORNER GUARDS

A. Fabricate stainless steel corner guards of 1.52 mm (.06inch) thick material conforming to ASTM A240/A240M, Type 304. Install corner guards from top of base to ceiling; refer to construction documents for ceiling heights.

2.3 END WALL GUARDS

A. Flush mount stainless steel end wall protectors of 0.060” thick material conforming to ASTM A240/A240M, Type 304. 2” wings, width to match wall, 1/8” radius corner. Install end wall guards from floor to ceiling.

2.4 WALL GUARDS AND HANDRAILS

A. Resilient Wall Guards and Handrails:

1. Handrail/Wall Guard Combination:

a. Round handrail system with integrated wall guard; 200 mm (7-7/8-inch) overall height, 38 mm (1-1/2-inch) gripping diameter with stainless steel returns, 127 mm (5-inch) high wall guard, 82 mm (3-1/4-inch) distance from wall.

b. Snap-on covers of resilient material, minimum 2 mm (0.078-inch) thick.

c. Free-floating on a continuous, extruded aluminum retainer, minimum 2 mm (.080-inch) thick.

d. Brackets shall be stainless steel type 201SS and have a vinyl base.

e. Anchor to wall at maximum 762 mm (30 inches) on center.

2. Wall Guards:

a. Recycled high-density polyethylene wall guards; 20 mm (8-inch) high, 13 mm (1/2-inch) deep.

2.5 HIGH IMPACT WALL COVERING

A. Provide sheets consisting of high impact rigid engineered PETG resilient material.

B. Sheet sizes to be 1.22m x 3m (4ft x 10ft).
C. Submit fire rating and extinguishing test results for resilient material.
D. Submit statements attesting that the items comply with specified fire and safety code requirements.
E. High Impact Wall Covering: Wall covering face and edge thickness to be 1.52 mm (0.060-inch).
F. Provide adhesive as recommended by the wall covering manufacturer.
G. Accessories:
1. Aluminum trim for .060” sheet thickness.
2. Type: Outside corners.

2.6 RIGID SHEET WALL PROTECTION

A. Provide sheets consisting of high impact rigid polyvinyl chloride resilient material.
B. Sheet sizes to be 1.22 x 2.44 m (4ft x 8ft).
C. Submit fire rating and extinguishing test results for resilient material.
D. Submit statements attesting that the items comply with specified fire and safety code requirements.
E. High Impact Sheet: Wall panel face and edge thickness to be 1.52 mm (0.060-inch).
F. Provide adhesive as recommended by the wall covering manufacturer.
G. Accessories:
1. Horizontal Top Cap Board: 1 mm (0.04-inch) thick polyvinyl chloride factory-bonded to MDF board; 9.5 mm (3/8-inch) thick, 50 mm (2-inch) high.

2.7 FIBERGLASS REINFORCED PLASTIC SANITARY WALL COVERING

A. Provide sheets consisting of Standard fiberglass reinforced plastic.
B. Size: 4 foot x 8 foot x .090 inch thick.

2.8 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.
B. Where type, size, spacing or method of fastening is not shown or specified in construction documents, submit shop drawings showing proposed installation details.

2.9 FINISH

A. Aluminum: In accordance with AA DAF-45.

1. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.
2. Exposed aluminum: Anodized.

B. Stainless Steel: In accordance with NAAMM AMP 500 finish Number 4.

C. Resilient Material: Embossed textures and color in accordance with SAE J1545.

D. FRP: Pebble textured surface.

PART 3 - INSTALLATION

3.1 STAINLESS STEEL CORNER GUARDS

A. Mount guards on external corners of interior walls, partitions and columns as shown on construction documents.

B. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow curing undisturbed for 24 hours.

3.2 STAINLESS STEEL END WALL GUARDS

A. Clean substrate to remove dust, debris, and loose particles.

B. Screw on: Position the end wall protectors on the wall and attach it using the supplied screws.

C. Install in accordance with manufacturer's details and instructions. Install level and plumb.

D. Install Height: From floor to ceiling.

3.3 WALL GUARDS AND RESILIENT WALL GUARD HANDRAIL COMBINATION

A. Secure to walls in accordance with manufacturer's details and instructions.

B. Install wall guards 6” AFF; cap fastener holes with matching color.

3.4 HIGH IMPACT WALL COVERING

A. Surfaces to receive protection to be clean, smooth and free of obstructions.

B. Apply with adhesive in controlled environment according to manufacturer’s recommendations.

C. Butt joints 1/16 with color-match caulk; trim outside corners with aluminum trim.

D. Install Height: Full height of partial-height walls at Reception and Nurse Stations.

3.5 RIGID SHEET WALL PROTECTION

A. Surfaces to receive protection to be clean, smooth and free of obstructions.

B. Apply with adhesive in controlled environment according to manufacturer's recommendations.

C. Butt joints 1/16 with color-match caulk; trim top with horizontal top cap boards.

D. Install Height: 48" AFF.

3.6 FIBERGLASS REINFORCED PLASTIC SANITARY WALL COVERING

A. Surfaces to receive protection to be clean, smooth and free of obstructions.

B. Inspect all panels for damage prior to installation.

C. Install per manufacturer's written instructions with tight vertical butt joints.

D. Install Height: 48" AFF.

3.7 CLEANING

A. Clean surfaces after installation and before final acceptance per manufacturer's recommendations.

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SECTION 04 2U 44
TOIMETR YATPR AN1 MA-N1GL ACCESSOGIES

.AGT 0 D QENEGAM

030 1ESCGI.TION

A. SUMMARY:

1. Section Includes: Toilet and bath accessories at dressing rooms, toilets, baths, locker rooms and other areas indicated on drawings.

032 A..MICAYME .-YMICATIONS

A. Comply with references to extent specified in this section.

B. American Society of Mechanical Engineers (ASME):

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

C. American Welding Society (AWS):

1. D10.4-86(2000) - Welding Austenitic Chromium-Nickle Stainless Steel Piping and Tubing.

D. ASTM International (ASTM):

1. A269/A269M-15 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
2. A312/A312M-15b - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
3. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
5. A1011/A1011M-14 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
6. B30-14a - Copper Alloys in Ingot Form.
7. B75/B75M-11 - Seamless Copper Tube.
8. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
9. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
10. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
11. B824-14 - General Requirements for Copper Alloy Castings.
12. C1036-11e1 - Flat Glass.
13. C1048-12e1 - Heat-Strengthened and Fully Tempered Flat Glass.

14. D635-14 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
15. F446-85(2009) - Grab Bars and Accessories Installed in the Bathing Area.

E. Federal Specifications (Fed. Spec.):
1. A-A-3002 - Mirror, Glass.
2. FF-S-107C(2) - Screws, Tapping and Drive.
3. WW-P-541/8B(1) - Plumbing Fixtures (Accessories, Land Use).

F. National Architectural Metal Manufacturers(NAAMM):
1. AMP 500-06 - Metal Finishes Manual.

03B S-Y5ITTAMS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
1. Show size, configuration, and fabrication, anchorage and installation details.
2. Show mounting locations and heights.

C. Manufacturer's Literature and Data:
1. Description of each product.
2. Installation instructions.

D. Samples:
1. Full sized, complete assembly of each product specified.
2. Approved samples may be incorporated into project.

E. Certificates: Certify each product complies with specifications.
1. Soap dispensers: Certify soap dispensers are fabricated of material that will not be affected by liquid soap, aseptic detergents, and hexachlorophene solutions.

F. Qualifications: Substantiate qualifications comply with specifications.

G. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.

036 V-AMITL ASS-GANCE

A. Manufacturer Qualifications:
1. Regularly manufactures specified products.

037 1EMIHEGL

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.

038 STOGAQE AN1 PAN1MINQ

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

03F 9AGGANTL

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

.AGT 2 D .GO1-CTS

230 5ATEGIAMS

A. Aluminum: ASTM B221M (ASTM B221), Alloy 6063-T5 and Alloy 6463-T5.

B. Stainless Steel:

1. Plate or Sheet: ASTM A666, Type 304, 0.8 mm (0.031 inch) thick unless otherwise specified.
2. Tubing: ASTM A269/A269M, Grade TP 304, seamless or welded.
3. Pipe: ASTM A312/A312M; Grade TP 304.

C. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.

D. Chrome Plating (Service Condition Number SC 2): ASTM B456.

E. Brass Castings: ASTM B30.

F. Copper:

1. Tubing: ASTM B75/B75M.
2. Castings: ASTM B824.

G. Glass:

1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors, and for mirror doors in medicine cabinets.
2. ASTM C1036, Type 1 Class 1 Quality q3, for shelves in medicine cabinets.
3. ASTM C1048, Kind FT, Condition A, Type 1, Class 1 for glass and mirrors in Mental Health and Behavior Patient Care Units, and Security Examination Rooms.

232 .GO1-CTS D QENEGAM

A. Provide each product from one manufacturer.

B. Products Used Within Mental Health and Behavioral Patient Care Units:

1. Provide accessories free of anchor points.
2. Design accessories for attachment with tamper resistant hardware.

23B QGAY YAGS

A. Fed. Spec. WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and complying with ASTM F446.

B. Fabricate from stainless steel or nylon coated steel, use one type throughout project:
   1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.

C. Mounting:
   1. Floor Mounted Grab Bars: Exposed type.
   2. Swing Up Grab Bars: Exposed type.
   3. Metal Partitions Mounted Grab Bars: Exposed type.
   4. Other Types and Locations: Concealed type.

D. Bars:
   1. Fabricate to 38 mm (1-1/2 inch) outside diameter.
      a. Stainless steel, minimum 1.2 mm (0.05 inch) thick.
   2. Fabricate in one continuous piece with ends turned toward walls.
      a. Swing up grab bars and grab bars continuous around three sides of showers may be fabricated in two sections, with concealed slip joint between.
   3. Continuously weld intermediate support to grab bar.

E. Flange for Exposed Mounting:
   1. Minimum 5 mm (3/16 inch) thick, maximum 79 mm (3-1/8 inch) diameter.
   2. Insert grab bar through flange and continuously weld perimeter of grab bar flush to backside of flange.
   3. Where mounted on partitions, provide three equally spaced, countersunk holes, sized to accommodate 5 mm (3/16 inch) diameter bolts.
   4. Where mounted on floor, provide four equally spaced holes, sized to accommodate 5 mm (3/8 inch) diameter bolts, maximum 5 mm (3/8 inch) from edge of flange.

F. Back Plates:
   1. Minimum 2.65 mm (0.1046 inch) thick metal.
   2. Fabricate in one piece, maximum 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.
   3. Provide spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on partitions.

236 CMOTPES POOWSR GOYE OG COAT

A. Fabricate hook units from chromium plated brass with satin finish, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to thickness of metal, or 3 mm (1/8 inch) minimum radius.

B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to wall flange, provided with concealed fastenings.

237 5ETAM ,GA5E1 5IGGOGS

A. Fed. Spec. A-A-3002 metal frame; stainless steel.

B. Mirror Glass:

1. Minimum 6 mm (1/4 inch) thick.
2. Set mirror in a protective vinyl glazing tape.

C. Frames:

1. Channel or angle shaped section with face of frame minimum 9 mm (3/8 inch) wide. Fabricate with square corners.
2. Metal Thickness 0.9 mm (0.035 inch).
3. Filler:
   a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers contoured to conceal void between back of mirror and wall surface.
   b. Fabricate fillers from same material and finish as mirror frame.

D. Back Plate:

1. Fabricate backplate for concealed wall hanging from zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame.
2. Provide set screw type theft resistant concealed fastening system for mounting mirrors.

E. Mounting Bracket:

1. Designed to support mirror tight to wall.
2. Designed to retain mirror with concealed set screw fastenings.

238 5O. GACWS

A. Minimum 1016 mm (24 inches) long with three holders.

B. Clamps:

1. Minimum of 1.3 mm (0.05 inch) thick stainless steel bracket retaining channel with hard rubber serrated cam; pivot mounted to channel.

2. Clamps to hold handles from 13 mm (1/2 inch) minimum to 32 mm (1-1/4 inch) maximum diameter.

C. Support:

1. Minimum 1 mm (0.04 inch) thick stainless steel hat shape channel to hold clamps away from wall as indicated.
2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.

D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.

23F ,AYGICATION D QENEGAM

A. Welding, AWS D10.4.

B. Grind, dress, and finish welded joints to match finish of adjacent surface.

C. Form exposed surfaces from one sheet of stock, free of joints.

D. Provide steel anchors and components required for secure installation.

E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.

F. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.

G. Hot-dip galvanized steel or stainless steel, anchors and fastening devices.

H. Shop assemble accessories and package with components, anchors, fittings, fasteners and keys.

I. Key items alike.

J. Provide templates and rough-in measurements.

K. Round and deburr edges of sheets to remove sharp edges.

23U ,INISP

A. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.

B. 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.

C. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

23X ACCESSOGIES

A. Fasteners:

1. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
2. Concealed Fasteners:
   a. Shower, Bathtubs, and High Moisture Areas: Stainless steel.
   b. Other Locations: Steel, hot-dipped galvanized.
3. Toggle Bolts: For use in hollow masonry or frame construction.
4. Sex bolts: For through bolting on thin panels.
5. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
6. Screws:
   a. ASME B18.6.4.
   b. Fed. Spec. FF-S-107, Stainless steel Type A.

B. Adhesive: As recommended by manufacturer to suit application.

.AGT B D EKEC-TION

B30 .GE.AGATION

A. Examine and verify substrate suitability for product installation.
   1. Verify blocking to support accessories is installed and located correctly prior to installation of wall finish material.

B. Verify location of accessories with Contracting Officer's Representative.

B32 INSTAMMATION

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 grab bars according to ASTM F446.

C. Set work accurately, in alignment and where indicated, parallel or perpendicular as required to line and plane of surface. Install accessories plumb, level, free of rack and twist.

D. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.

E. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance.

F. Align mirrors, dispensers and other accessories even and level, when installed in battery.

G. Install accessories to prevent striking by other moving, items or interference with accessibility.

B3B CMEANINQ

A. After installation, clean toilet accessories according to manufacturer’s instructions.

B36 .GOTECTION

A. Protect accessories from damage until project completion.

- - E N D - -

SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. Acrylic glazing: Section 08 80 00, GLAZING.

B. Field Painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Testing and Materials (ASTM):

D4802-15 .....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

A. Recessed type with flat trim of size and design shown.

2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
2. Design doors to open 180 degrees.
3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

A. Finish interior of cabinet body with baked-on semigloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

B. Install cabinet so that the extinguisher height within meets the requirements of NFPA 10.

- - - E N D - - -

SECTION 10 51 13
PEDESTAL BENCH

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers metal lockers and wood bench with heavy duty pedestals.

1.2 RELATED REQUIREMENTS

A. Locker and Bench Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Manufacturers literature and data: Locker fabrication, bench construction, finishes, and installation instructions.

PART 2 - PRODUCTS

2.1 LOCKERS

A. Equal to Lyon, Tennsco or Edsal.

1. Size: 15”W x 12”D x 78”H, including 6” base.
2. Body: 24 gage (0.6 mm).
3. Door: 16 gage (1.5 mm).
4. Frames: 16 gage (1.5 mm).
5. Trim: 20 gage (0.9 mm).
6. Finish: Baked Enamel, Color: To be selected from Manufacturer’s Standard Colors.
7. Base: Continuous base cover.
8. Top: Provide sloped top.
9. Quantity: See plans

B. For each Locker: One double prong ceiling hook and three single prong wall hooks, metal plate number, rubber bumper, multipoint auto-locking system, stainless steel recessed handle to accommodate padlock. Provide storage shelf.

2.2 PEDESTAL BENCH

A. Bench Top: Laminated hardwood, 1-1/4” full finished thickness, all corners rounded and sanded, 12” wide x 17-1/2” high overall assembly height, lengths as indicated on plans.

B. Pedestal: 1-1/2” diameter steel tubing with 10 gauge, 8” diameter steel flanges welded to each end. Three (3) 1”x1/4" lag screws per pedestal.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install in accordance with Manufacturer’s instructions.

B. Install lockers and benches plumb and square.

3.2 CLEANING

A. Clean locker interiors and exterior surfaces.

B. Clean benches.

- - - E N D - - -

SECTION 11 73 00
CEILING MOUNTED PATIENT LIFT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

1.3 QUALITY ASSURANCE

A. Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by the manufacturer who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1.

B. Inspection of equipment after installation is required prior to use for patient movement. Inspection shall be in accordance with manufacturer’s installation checklist and the facilities installation checklist

C. Certification of compliance with VA requirements shall be provided by an independent third party, Inspector of Record (IOR), who will observe installation and manufacturer’s testing to ensure that the ceiling structure, ceiling lift, and charging system is safe and compliance with shop drawings, structural calculations, specifications, ISO 10535 requirements, and code requirements. IOR shall be a registered structural engineer in the state of installation.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1. Shop drawings shall show structural supports to the underside of structure. Structural calculations for the support of the track and its attachment to ceiling structure shall be submitted. Shop drawings used in the quoting phase shall be PDFs, and either 2D CAD files or 3D BIM files showing structural support to underside of structure. Shop drawings shall also provide general room layout with bed position and all obstructions to ceiling lift.

2. Once the purchase order is accepted by the vendor, a set of stamped drawings shall be provided by the vendor. Shop drawings and structural calculations shall be signed and stamped by a registered structural engineer, and shall meet all code requirements in the jurisdiction having authority. Structural engineer shall ensure ceiling minimum structure capacity shall support the loads specified in the shop and installation drawings and be in compliance with local structural codes.
3. Shop drawings shall show obstructions such as curtains, lights and sprinklers, and coordinate their relocation.
4. Manufacturer shall provide BIM (Building Information Model) for clash detection on the request of the Project Engineer or General Contractor.

B. Certificates of Compliance from Manufacturer

C. Manufacturer's Literature and Data:

1. Lifting Capacity
2. Lifting Speed
3. Vertical Axis Motor
4. Emergency Brake
5. Emergency Lowering Device
6. Emergency Stopping Device
7. Electronic Soft-Start and Soft-Stop Motor Control
8. Current Limiter for Circuit Protection
9. Strap Length, spreader bar and sling.
10. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity of the structural support, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.

D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.

E. Manufacturer’s Checklist for after installation inspection.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are listed in the text by the basic designation only.

B. International Organization for Standardization (ISO):

10535-06 .....Hoist for the Transfer of Disabled Persons-Requirements and Test Methods

C. Underwriters Laboratories (UL):

60601-1(2003) .....Medical Electrical Equipment: General Requirements for Safety

94-2013 .....UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):

60601-1-2(2015) .....Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests.

PART 2 - PRODUCTS

2.1 PATIENT LIFT SYSTEM

A. Manufacturer: Equal to LIKO Overhead Patient Lift.

2.2 CEILING TRACK SYSTEM

A. The Ceiling Track shall be made from high strength extruded aluminum or VA approved equal. Provide anchor supports at ceiling substrate.

B. Installed rail shall be security tested for 1.5 times greater than the motor's weight capacity and maximum allowable deflection of a horizontal rail is no more than 1mm (1/16th inch) per 200mm (7.87 inch) of track length. (As per ISO 10535 standards.)

2.3 LIFT UNIT

A. The Lift Unit shall be constructed of a steel frame system driven by a gear reduced high torque motor or VA approved equal.

B. The Lift system shall have the following features.

1. Lifting capacity: 750-1000 lbs. (340.194- 498.952 kg)for bariatric lifts.
2. Electronic soft-start and soft-stop motor control
3. Emergency lowering device
4. Emergency stopping device
5. Current limiter for circuit protection in case of overload.
6. Safety device that stops the motor to lift when batteries are low.
7. Emergency brake (in case of mechanical failure)
8. Strap length:

9. Cab: VO plastic-fire retardant, UL 94
10. Charging Indicators: Audible beep and lighted low battery indicator.

2.4 MOTORS

A. Vertical Movement-DC Motor

B. Horizontal Movement-DC Motor

2.5 BATTERIES

A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 6100-1-2.

B. Provide rechargeable batteries with up to 35 transfers with a load of 200lbs (74kg) (for repositioning) a minimum of 17 transfers with its maximum load.

2.6 CHARGER

A. Charger: "On-wall" Patient Room wall mounted charging.

2.7 STRAPS AND SLING

A. The straps shall meet ISO 10535 guidelines. The straps shall ensure the patient's safety by preventing the patient from falling out of the sling. Strap length up to 2.3 m (90").

B. The sling shall meet ISO 10535 guidelines. The sling shall cradle the body of the patient. Bariatric slings shall be rated to a minimum of 750 lbs.

C. Sling and sling accessories: As recommended by Manufacturer for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.

B. If the distance in between the suspended ceiling and anchors is more than 12" consult with manufacturer to determine if lateral braces will be required.

3.2 INSTRUCTION AND PERSONNEL TRAINING

A. Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

A. Conduct performance test, in the presence of the Resident Engineer (RE) and/or Inspector of Record (IOR), and a manufacturer's field representative, to show that the patient lift system equipment and

control devices operate properly and in accordance with design, specification, and code requirements.

3.4 INSPECTION

A. Inspection of installed ceiling mounted patient lift systems shall be conducted in accordance with the manufacturer's installation checklist and the VA installation checklist (Patient Safety Alert AL14-07) prior to use for patient movement.

B. Periodic Inspection shall be provided by the manufacturer on a yearly basis in compliance with ISO 10535.

- - - E N D - - -

SECTION 12 11 13
EDGE-ILLUMINATED PHOTO MURALS

PART 1 - GENERAL

1.1 SUMMARY:

A5 S.ectio Ioenlu.ds

:5 Eua.-tnnlLto:c.u mgici Llr:nd5

,5 Giiu crtL5

1.2 RELATED WORK:

A5 P:toc einir Wir ktouik crtLs S.ectio 09 06 00y SCMEDUHE wOR wINISMES5

B5 C.tntoa-Liloc.u lotcd dtLtn:r ci .ua.-tnnlLto:c.u mgici Llr:nds S.ectio 09 f4 16y HUpINOUS CEIHINvS5

C5 wt.nu-:mmnt.u Wtotdg.ds S.ectio 09 91 00y PAINTINv5

D5 Pik.r eio’.rc.rds Dt’tdtio 26y EHECTRICAH5

1.3 DELIVERY, STORAGE AND HANDLING:

A5 D.nt’.r mriulecd to L:olW:eclr.rhd irtato:n m:eb:atoa5 Scir. L:c.rt:nd touiird to nie:ctio cg:c td d.elr.y urqy :ou g:d dc:,n. c.Lm.r:clr.5 M:oun. to :eeiru:oe. ktcg L:olW:eclr.rhd todcrlectiod ci mr.’.oc u:L:a.5

1.4 AMBIENT CONDITIONS:

A5 Di oic todc:nn loctn m.rL:o.oc MVAC .zltmL.oc td kirbtoa :ou :L,t.oc c.Lm.r:clr. :ou glLtutcq g:d dc:,tnt;.u5

1.5 SUBMITTALS:

A5 Io :eeiru:oe. ktcg S.ectio 01 33 23y SMOP DRAGINvSy PRODUCT DATAy AND SApPHESy dl,Ltc cg. Winniktoas

15 Sgim Dr:ktoads Sl,Ltc ur:ktoad dgiktoa eiodcrlectioy dt;. :ou dg:m. iW .ua.-tnnlLto:c.u mgici Llr:nd :ou crtLj tu.octWte:ctio iW :rckirbj n:qilc tL:a. m:o.ndj ktrtoa ut:ar:Lj :ou eiiruto:ctio ktcg :uF:e.oc kirb5

25 Priulec D:c:s Sl,Ltc Wir .:eg cqm. iW mriulec dm.etWt.u5

35 S:Lmn.ds

:5 Arckirbs Sl,Ltc cgr.. ,q cgr.. toeg d:Lmn.d dgiktoa zl:ntcq iW ar:mgte r.mriulectio5

,5 TrtLs Sl,Ltc cgr..-toeg nioa d:Lmn.d iW kiiu crtL5

45 p:olW:eclr.rhd Iodcrlectiods Sl,Ltc L:olW:eclr.rhd todc:nn:ctio todcrlectiod5

f5 Om.r:ctio :ou p:toc.o:oe. D:c:s

:5 Sl,Ltc L:olW:eclr.rhd im.r:ctio :ou L:toc.o:oe. todcrlectiod5

,5 Sl,Ltc eimq iW L:olW:eclr.rhd mriar:L Wir tL:a. m:o.n r.mn:e.L.oc5

65 G:rr:ocq DielL.oc:ctios Sl,Ltc d:Lmn. iW L:olW:eclr.rhd ntLtc.u k:rr:ocq5

1.6 WARRANTY:

A5 Ciodcrlectio G:rr:ocqs CiLmnq ktcg wAR en:ld. f25246-21 "G:rr:ocq iW Ciodcrlectio"5

B5 Pri'tu. L:olW:eclr.rhd c.o-q.:ry mri-r:c.uy ntLtc.u k:rr:ocq :a:todc 'tdt,n. W:u. ir einir dgtWc to tL:a. m:o.nd5

PART 2 - PRODUCTS

2.1 EDGE-ILLUMINATED PHOTO MURALS:

A5 B:dtd iW D.dtaos Ezl:n ci HlLtoild Vtrcl:n Gtouik .ua.-tnnlLto:c.u mgici Llr:nd :d L:olW:eclr.u ,q Sbq w:ecirqy Ioe5j mgio.s 641-472-1747j W:xs 641-472-1014j kkk5dbqW:ecirq5eiLj toWi@Sbqw:ecirq5eiL5

B5 v.o.r:n R.zltr.L.ocds

15 InnlLto:ctio dg:nn ,. utdcrt,lc.u lotWirLnq :eridd dlrW:e. iW tL:a. m:o.nd ktcgilc W:nn-iWW :c .ua.dy gic dmicdy ir dg:uikd5

C5 C:d.ds

15 D.dtaos C:d.d dg:nn ,. todc:nn:,n. to 2-toeg LtotLlL u.mcg :ou mri'tu. gildtoa Wir n:Lmd ci :nnik .ua.-tnnlLto:ctio iW tL:a. m:o.nd5

25 Add.L,n. :nlLtolL .xcrldtiod toci Wr:L.d ktcg Ltc.r.u eiro.rd5

35 Aee.dds wr:L.d dg:nn g:'. ;-cqm. ,r:eb.c Wir :ee.dd ci tL:a. m:o.nd5 Ezltm ktcg c:Lm.r-r.dtdc:oc u.'te.d ci r.dtdc lo:lcgirt;.u :ee.dd5

45 wtotdgs Cn.:r-:oiut;.u :nlLtolL5

f5 St;.s Ezl:n ci Sbq w:ecirq piu.n Ni5 SNvHf2285

D5 H:Lmds Pri'tu. cg. Winniktoa cqm.s

15 HED Htagctoay R:uti wr.zl.oeq Ioc.rW.r.oe. &RwI(-wr..s H:Lmd dg:nn ,. ntagc-.Ltcctoa utiu. &HED(:rr:qd ktcg 6f00) einir c.Lm.r:clr. &u:qntagc ,:n:oe.u(y 40y000-gilr .dctL:c.u d.r'te. ntW.5

E5 IL:a. P:o.nds

15 Prtoc tL:a.d io cr:odnle.oc ar:mgte L.ut: ktcg gtag-zl:ntcqy UV-r.dtdc:ocy mtaL.oc.u tobd Liloc.u io :erqnte m:o.n5

25 Iod.rc tL:a.d io ntagc utWWldtio m:o.nj L:c.rt:nd dg:nn ,. cqm.d :mmri'.u WirL ld. to ntagc Wtxclr.d5 Htagc altu. m:o.n dg:nn ,. ,:eb.u ,q ntagc-r.Wn.ect'. L:c.rt:nd5

35 Arckirbs Ezl:n ci Sbq w:ecirqy "H:b. K Rt'.rd"y Ni5 8g:H5

w5 TrtLs Pri'tu. L:olW:eclr.rhd dc:ou:ru crtL dtLln:ctoa ktouik Wr:Ltoa5

15 Sm.et.d :ou wtotdgs PrtL.u Pimn:r5

25 Gtouik wr:L.s p:olW:eclr.rhd Rldcte5

35 S:dg.ds w:ecirq-an:;.uy im.r:,n. tok:ru-dktoatoa e:d.L.oc ktouik d:dg.d5

:5 wr:L.s p:ceg crtL5

,5 vn:dds T.Lm.r.u an:dd5

e5 M:ruk:r.s S:cto oteb.ny :d dc:ou:ru Wir L:olW:eclr.r5

45 piloctoas Smrtoa-ni:u.u ,:nn-e:ceg.d5

v5 Pik.rs M:ru-ktr.u 110V AC ktcg toc.ar:n 24V DC eio'.rc.r5

2.2 ACCESSORIES:

A5 Pri'tu. W:dc.o.rdy ,niebtoay :ou icg.r :ee.ddirt.d r.zltr.u Wir eiLmn.c. todc:nn:ctio5

PART 3 - EXECUTION

3.1 EXAMINATION:

A5 Ex:Lto. :r.: r.e.t'toa kirb iW cgtd S.ectio ci tu.octWq eioutctiod cg:c L:q :u'.rd.nq :WW.ec todc:nn:ctio5 Di oic ,.ato todc:nn:ctio loctn :u'.rd. eioutctiod g:'. ,..o r.L.ut.u5

3.2 PREPARATION:

A5 Om.otoad ci r.e.t'. .ua.-tnnlLto:c.u mgici Llr:nd dg:nn ,. dt;.u :eeirutoa ci Llr:n L:olW:eclr.rhd r.zltr.L.ocd5

3.2 INSTALLATION:

A5 Iodc:nn to :eeiru:oe. ktcg L:olW:eclr.rhd todcrlectiod :ou :mmri'.u dgim ur:ktoad5

B5 Iodc:nn e:dtoad5

C5 p:b. eioo.ectiod ci mik.r :ou todc:nn n:Lmd :d dm.etWt.u to Dt'tdtio 26y EHECTRICAH5

D5 Iodc:nn crtL5

E5 R.m:tr u:L:a. :ou :uFldc todc:nn:ctioy tW r.zltr.uy ci mri'tu. :ccr:ect'. :mm.:r:oe.y mri'tu. lotWirL tnnlLto:ctio :eridd W:e. iW tL:a. m:o.nd5

3.3 CLEANING:

A5 Cn.:o tL:a. m:o.nd to :eeiru:oe. ktcg L:olW:eclr.rhd todcrlectiod5

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SECTION 12 31 00
MANUFACTURED METAL CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies stainless steel wall cabinets.

1.2 RELATED WORK:

A. Sealants: Section 07 92 00, JOINT SEALANTS.

B. Color of Casework Finish: Section 09 06 00, SCHEDULE OF FINISHES.

C. Backing Plates for Wall Mounted Casework: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 QUALITY ASSURANCE:

A. Approval by Contracting Officer Representative (COR) is required of manufacturer and installer based upon certification of qualifications specified.

B. Manufacturer’s Qualifications:

1. Manufacturer is regularly engaged in design and manufacture of metal of scope and type similar to requirements of this project for a period of not less than five (5) years.
2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to requirements of this project.
3. Submit manufacturer’s qualifications and list of projects.

C. Installer Qualifications:

1. Installer has completed at least three (3) projects in least five (5) years in which these products were installed.
2. Submit installer qualifications.

1.4 SUBMITTALS:

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

B. Certificates:

1. Manufacturer's Certificate of qualifications specified.
2. Certificate of installer’s qualifications specified.

C. Manufacturer's Literature and Data:

1. Brochures showing name and address of manufacturer, and catalog or model number of each item incorporated into the work.
2. Manufacturer's illustration and detailed description.
3. List of deviations from contract specifications.

D. Shop Drawings (1/2 Full Scale):

1. Showing details of casework construction, including kinds of materials and finish, hardware, accessories and relation to finish of adjacent construction, including specially fabricated items or components.
2. Fastenings and method of installation.

E. Manufacturer's warranty.

1.5 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their metal casework for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.6 APPLICABLE PUBLICATIONS:

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

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

A240/A240M-14 .....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

B456-11 .....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C. Builders Hardware Manufacturers Association (BHMA):

A156.9-10 .....Cabinet Hardware

A156.16-13 .....Auxiliary Hardware

D. American Welding Society (AWS):

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

D1.3/D1.3M-05(R2008) ...Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series .....Metal Finishes Manual

F. Federal Specifications (Fed. Spec.):

A-A-55615 .....Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Stainless Steel: ASTM A240/A240M, Type 304.

B. Fasteners:

1. Exposed to View: Chrome plated steel or stainless steel, or finished to match adjacent surface.
2. Provide round head or countersunk fasteners where exposed in cabinets.
3. Expansion Bolts: Fed Spec. A-A-55615. Do not provide lead or plastic shields.
4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
5. Hex Bolts: Capable of supporting twice the load.

2.2 MANUFACTURED PRODUCTS:

A. Basis of Design: Equal to stainless steel casework manufactured by Mott Manufacturing Ltd.

B. When two (2) or more units are required, use products of one (1) manufacturer.

C. Manufacturer of casework assemblies is to assume complete responsibility for the final assembled unit.

D. Provide products of a single manufacturer for parts which are alike.

2.3 CASEWORK FABRICATION:

A. General:

1. Welding: Comply with AWS Standards D1.1/D1.1M and D1.3/D1.3M.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.
3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

0.89 mm (0.035 inch) (20 gage)	Closure plates or scribe and filler strips less than 75 mm (3 inches) wide, sloping top, shelf reinforcement channel and shelves. Casework soffits and ceilings under sloping tops.
1.20 mm (0.047 inch) (18 gage)	Casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (3 inches) or more. Door exterior and interior panels. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets.
1.49 mm (0.059 inch) (16 gage)	Reinforcing gussets, spreaders and stretchers when formed without welding. Other metal work. Front top rails and back rails except top back rails may be 1.2 mm (0.047 inch) (18 gage) thick.

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front. Include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile, 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of walls units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets.
7. Provide finish panel on exposed cabinet backs.
8. Do not install screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, removable panels, and where casework is required to be fastened, end to end or back to back.
9. Fabricate casework with finished end panels.
10. Provide reinforcing for hardware.
11. Size Dimensions:
    a. Use dimensions shown on construction documents or within tolerances specified.
    b. Tolerance:

	Depth	Nominal Dim (mm (inch))	Plus Tolerance (mm (inch))	Minus Tolerance (mm (inch))
	Depth	305 (12)	1 (25)	0 (0)
	Width	- -	0 (0)	1 (25)
Wall Hung Cabinet	Height	- -	1 (25)	1 (25)

1) Manufacturer's Tolerance for the same Length, Depth or Height of Cabinet: Not to exceed 1.58 mm (0.0625 inches).

D. Doors:

1. Hollow metal type, not less than 16 mm (5/8 inch) thick.
2. Fabricate doors of two (2) panels formed into pans with corners welded and ground smooth. Provide doors with a sound deadening core.
3. Sliding doors: Provide stops to prevent bypass.
4. Doors removable without use of tools except where equipped with locks.

E. Sloping Tops:
   1. Provide sloping tops for casework where shown on construction documents.
   2. Where ceilings interfere with installation of sloping tops, provide filler plates as specified.
   3. Omit sloping tops or filler plates whenever a gypsum wall board bulkhead assembly is furred down to top face of casework.
   4. Provide exposed ends of sloping tops with flush closures.
   5. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.

F. Shelves:
   1. Capable of supporting an evenly distributed minimum load of 122 kg per square meter (25 pounds per square foot) without visible distortion.
   2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
   3. For shelves over 1067 mm (42 inches) in length and over 305 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1 1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
   4. Weld shelves to metal back and ends unless shown on construction documents as adjustable.
   5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.

2.4 HARDWARE:

A. Factory installed.

B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.

C. Cabinet Hardware: ANSI BHMA A156.9.
   1. Door Pulls: B02011.
      a. Sliding door flush pull, each door: B02201.
      d. Provide door pulls of a design that can be operated with a force of 22.2 N (5 pounds) or less, with one (1) hand and not require tight grasping, pinching or twisting of the wrist.
   2. Shelf Supports:
      a. Install in casework where adjustable shelves are noted on construction documents.

b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.

3. Sliding Doors:
a. Doors supported by two (2) ball bearing bronze or nylon rollers or sheaves riding on a stainless steel track.
b. Sliding Door Tracks: B07093. Plastic tracks not acceptable.
c. Doors restrained by a nylon, polyvinylchloride, or stainless steel guide at opposite end.

4. Auxiliary Hardware: ANSI A156.16.

2.5 METAL FINISHES:

A. Comply with NAAMM AMP 500 series and as specified.
B. Stainless Steel Cabinets including Closures and Filler Strips:
1. 304 Stainless Steel, Mechanical Finish No. 4.
2. After fabrication of cabinet submerge in a degreasing bath, and thoroughly rinse to remove dirt and grease, and other foreign matter.
C. Brass:
1. U.S. Standard Finish No. 26 for hardware items.
2. Other brass items: ASTM B456, chromium plated finish meeting requirements for Service Condition SCI.

PART 3 - EXECUTION

3.1 COORDINATION:

A. Begin only after work of other trades is complete, including wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected, and area free of trash and debris.
B. Verify location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.
C. Verify reinforcement of walls and partitions for support and anchorage of casework.
D. Coordinate with other Divisions and Sections of the specification for work related to installation of casework systems to avoid interference and completion of service connections.

3.2 INSTALLATION:

A. Install casework in accordance with manufacturer’s written instructions and per SEFA 2.3 recommendations.

1. Install in available space; arranged for safe and convenient operation and maintenance.
2. Align cabinets for flush joints except where shown otherwise on construction documents.
3. Install with bottom of wall cabinets aligned level, plumb, true, and straight to a tolerance of 3.2 mm in 2438 mm (1/8 inch in 96 inches).

B. Wall Strips:
1. Install true to vertical and spaced as shown on construction documents.
2. Align slots to assure that hanging units will be level.

C. Plug Buttons:
1. Install plug buttons in predrilled or pre-punched perforations not used.
2. Use chromium plate plug buttons or buttons finish to match adjacent surfaces.

D. Seal junctures of casework systems with mildew-resistant silicone sealants as specified in Section 07 92 00, JOINT SEALANTS.

3.3. CLOSURES AND FILLER PLATES:

A. Close openings larger than 6 mm (1/4 inch) wide between cabinets and adjacent walls with flat, steel closure strips, scribed to required contours, or machined formed steel fillers with returns, and secured with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.

B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.

C. Secure filler plates to casework top members, unless shown otherwise on construction documents.

D. Anchor angle to ceiling with toggle bolts.

E. Finish closure strips and fillers with same finishes as cabinets.

3.4 FASTENINGS AND ANCHORAGE:

A. Do not anchor to wood ground strips.

B. Provide hat shape metal spacers where fasteners span gaps or spaces.

C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.

D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.

E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to blocking for concealed fasteners.
F. Use screws with not less than 38 mm (1 1/2 inch) penetration into blocking.
G. Space fastening devices 305 mm (12 inches) on center with minimum of three (3) fasteners in 915 or 1219 mm (3 or 4 foot) unit width.
H. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
I. Where units abut end to end, anchor together at top and bottom of sides at front and back.
J. Where type, size, or spacing of fastenings is not shown or specified on construction documents, show on shop drawings proposed fastenings and method of installation.

3.5 ADJUSTMENTS:

A. Adjust equipment to insure proper alignment and operation.
B. Replace or repair damaged or improperly operating materials, components or equipment.

3.6 CLEANING:

A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.
B. Remove from job site trash, debris and packing materials resulting from work of this section.
C. Leave installed areas clean of dust and debris resulting from work of this section.

3.7 INSTRUCTIONS:

A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.
B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.
C. Commencing at least seven (7) days prior to opening of facility, provide one (1) 4-hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

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SECTION 12 35 70
HEALTHCARE CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Modular metal casework including floor base units, tall units, overhead units, countertops, and accessory items.

1.2 RELATED WORK:

A. Countertops (unattached to Healthcare Casework) and Plastic Resin Decorative Panels: Section 06 20 00, FINISH CARPENTRY.

B. Sealants: Section 07 92 00, JOINT SEALANTS.

C. Color of Casework and Countertop Finish: Section 09 06 00, SCHEDULE OF FINISHES.

D. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

E. Backing Plates for Wall Mounted Casework: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

F. Plumbing Requirements Related to Casework: Division 22, PLUMBING.

G. Electrical Lighting and Power Requirements Related to Casework: Division 26, ELECTRICAL.

1.3 QUALITY ASSURANCE:

A. Approval by Contracting Officer Representative (COR) is required of manufacturer and installer based upon certification of qualifications specified.

B. Manufacturer’s Qualifications:

1. Manufacturer is regularly engaged in design and manufacture of metal of scope and type similar to requirements of this project for a period of not less than five (5) years.
2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to requirements of this project.

C. Installer Qualifications:

1. Installer has completed at least three (3) projects in least five (5) years in which these products were installed.

1.4 SUBMITTALS:

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

B. Manufacturer's Literature and Data:

1. Submit manufacturer’s product data for each type of product.

C. Shop Drawings (1/2 Full Scale):

1. Complete list of products, sizes and manufacturer's descriptive and technical literature.
2. Requirements for utility connections.
3. Requirements for blocking and support.
4. Keying schedule as applicable.

D. Samples:
1. Representative sample of each type of finish and color.

E. Operations and Maintenance Data: Submit manufacturer's recommendations for cleaning and maintenance, including a list of spare parts and information for ordering.

F. Manufacturer's warranty.

1.5 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their wood casework for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.6 APPLICABLE PUBLICATIONS:

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

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

A36/A36M-14 .....Carbon Structural Steel

A240/A240M-14 .....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A283/A283M-13 .....Low and Intermediate Tensile Strength Carbon Steel Plates

A568/A568M-14 .....Steel, Sheet, Carbon and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements

A794/A794M-12 .....Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16% Maximum to 0.25% Maximum) Cold Rolled

B456-11 .....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

E84-11 .....Surface Burning Characteristics of Plastics and Alloys Building Materials

C. American National Standard Institute:

A208.1-09 .....Particleboard

A208.2-09 .....Medium Density Fiberboard (MDF) for Interior Applications

Z97.1-09(R2010) .....Safety Glazing Material used In Buildings

D. Builders Hardware Manufacturers Association (BHMA):

A156.1-13 .....Butts and Hinges

A156.9-10 .....Cabinet Hardware

A156.5-14 .....Auxiliary Locks and Associated Products

A156.11-14 .....Cabinet Locks

A156.16-13 .....Auxiliary Hardware

E. American Welding Society (AWS):

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

D1.3/D1.3M-05(R2008) ...Structural Welding Code Sheet Steel

D9.1/D9.1M-06(R2012) ...Sheet Metal Welding Code

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series .....Metal Finishes Manual

G. National Electrical Manufacturers Association (NEMA):

LD 3-05 .....High Pressure Decorative Laminates

H. U.S. Department of Commerce, Product Standard (PS):

PS 1-09 .....Construction and Industrial Plywood

I. Underwriters Laboratories Inc. (UL):

325-06(R2013) .....Door, Drapery, Gate, Louver, and Window Operators and Systems

437-08(R2013) .....Key Locks

J. Federal Specifications (Fed. Spec.):

A-A-55615 .....Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

K. Scientific Equipment and Furniture Association (SEFA):

2.3-10 .....Installation of Scientific Laboratory Furniture and Equipment

L. Underwriters Laboratories (UL):

Annual Fire Resistance Directories

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION:

A. Basis of Design: Section 09 06 00, SCHEDULE OF FINISHES.

B. Design Requirements: Casework shall be metal, modular, with each unit being an individual, interchangeable, integral part of assembly for

making up desired casework unit. Each sectional unit shall be rigid and depend on no other component part of complete assembly for its rigidity. Internal components such as drawers, glides, shelves, and similar items shall be modular and interchangeable.

C. Performance Requirements: Provide healthcare casework which has been manufactured, fabricated and installed to withstand the medical environment and maintain manufacturer's warranted performance without defects, damage, or failure.

2.2 MODULAR METAL CASEWORK:

A. General:
   1. Sizes and Configuration: As indicated on the Drawings.
   2. Metal Finish: Premium powder-coat, baked-on epoxy.
   3. Metal Finish: 7 mil high-performance finish applied to powder-coated steel frame.
   4. Colors and Styles: Section 09 06 00, SCHEDULE OF FINISHES.

B. Casework Assembly:
   1. Design: Individual, interchangeable, integral, modular units.
   2. Cabinet: 18-gauge cold rolled steel; multi-piece shell and frame design; riveted and press joined.
   3. Filler and Trim: Manufacturer's standard coordinated components.

C. Door Construction:
   1. Panel Style: Flush.
   2. Front/Back: 12 mil seamless polymer-covered front; melamine back.
   3. Reveal: 1 mm reveal from the edge of the frame.
   4. Core: 45 lb. LEED IEQ compliant MDF board, 3/4 inch thick. Composite wood material to meet CARB P2 emission std of CARB regulation 91320.2. 5. Hinges: Manufacturer's standard Blum, concealed, self-closing, 110 degree opening, nickel-plated metal, clip-on mount, three adjustment points.
   6. Pulls: Manufacturer’s standard 128 mm pull.

D. Drawers:
   1. Deep Drawer Construction: One piece molded polystyrene drawer bodies with rounded corners.
   2. File Drawer Construction: 18 gauge cold rolled steel frame; including suspended file system and file bars.
   3. Front/Back: 12 mil seamless polymer-covered front; melamine back.
   4. Reveal: 1 mm reveal from the edge of the frame.

5. Core: 45 lb. LEED IEQ compliant MDF board, 3/4 inch thick. Composite wood material to meet CARB P2 emission std of CARB regulation 91320.2.
6. Slides: Manufacturer's standard (100 lb. capacity) ball bearing slides; and heavy duty (200 lb capacity) slide for file drawers and heavy-duty pull-out shelves.
7. Pulls: Manufacturer’s standard 128 mm pull.

E. Adjustable Shelving: 18-gauge cold rolled steel, painted to match cabinet color; manufacturer's standard die cast zinc support clips.

F. Locks:
1. Doors: Manufacturer's standard, individually mounted, cam style lock removable lock plug; locks keyed alike with two keys per lock.
2. Drawers: Manufacturer's standard lock body with removable lock plug with 14-gauge cold rolled steel pivoting lock bar for central lock system; locks keyed alike with two keys per lock.

G. Countertops, Standard Laminate:
1. Edges: Square laminate self-edge.
2. Countertops: LEED IEQ compliant particle board core. Composite wood material to meet CARB P2 emission std of CARB regulation 91320.2.
3. Horizontal Surfacing: 0.045-inch-thick, matte finish.

H. Countertops, Solid Surfacing:
1. Materials: Solid surfacing.
2. Countertops: LEED IEQ compliant MDF core. Composite wood material to meet CARB P2 emission std of CARB regulation 91320.2.
4. Horizontal Surfacing: 0.5-inch-thick, matte finish.

I. Filler Panel/Leg Supports: LEED IEQ compliant MDF core. Composite wood material to meet CARB P2 emission std of CARB regulation 91320.2.

PART 3 - EXECUTION

3.1 COORDINATION:

A. Begin only after work of other trades is complete, including wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected, and area free of trash and debris.

B. Verify location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.

C. Verify reinforcement of walls and partitions for support and anchorage of casework.

D. Coordinate with other Divisions and Sections of the specification for work related to installation of casework systems to avoid interference and completion of service connections.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions, approved submittals and in proper alignment with adjacent work. Provide installation method suitable for substrate and project conditions. Test operable components for proper operation and adjust until satisfactory results are obtained.

3.3 CLEANING AND PROTECTION

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

B. Protect casework against damage until accepted. Restore damaged components and finishes as necessary so no evidence remains of corrective work.

3.4 INSTRUCTIONS:

A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.

B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.

C. Commencing at least seven (7) days prior to opening of facility, provide one (1) 4-hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

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