BID SET – FOR CONSTRUCTION

Specifications
(Volume 1)

Consolidate Intensive Care Unit

Project Number: 658-317

VA Medical Center
1970 Roanoke Boulevard
Salem, VA 24153

~~August 13, 2020~~

Rev Date 6-9-2026
See Next Page for Revision details

Atriax GROUP

Planning, Design, Construction
and Related Services

Specification Vol I Revision date 6-9-2026
The revision makes the following changes to the set issued with the original solicitation.

A. ADDED sheet 14 of 811, with language to replace in its entirety a section of Spec 01 00 00, Section 1.3. The new Section 1.3 language clarifies and provides delivery date for the deduct alternate for the project.

B. Deleted 31 sheets and ADDED sheets 68 through 105 of 811 (37 sheets) in Vol I of the specification set. This removed the former Specification 01 35 26 in its entirety (Safety Requirements) and replaced it with a more current version of the same specification. The primary change is made to take advantage of new more flexible requirements regarding crane operations in the VA Spec itself, and to take advantage of the use of US Army Corps of Engineers Safety Standard EM385, which is permitted by the spec. Both of these offer a method to work with a crane safely above existing, occupied space.

Note there was no change to the Vol II specifications. They are current as of the date on the cover, 11/12/2025.

Consolidate Intensive Care Unit

VA Project #: 658-317

Salem VAMC
Salem, Virginia

SEAL and SIGNATURE PAGE

Specification divisions and sections bound herein are listed below under the name of the Designer-of-Record responsible for their preparation, under whose seal and/or authority each document so listed is issued for the purpose(s) stated above. Seals and signatures do not apply to documents not listed below, nor to documents prepared by the government or others, including (except as otherwise indicated) sections in Division 00 Procurement and Contracting Requirements and Division 01 General Requirements, Geotechnical Reports, etc.

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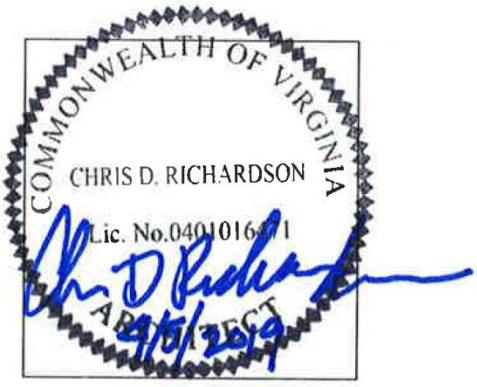

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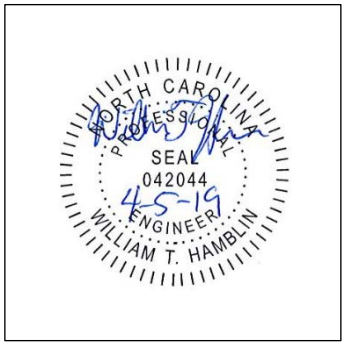

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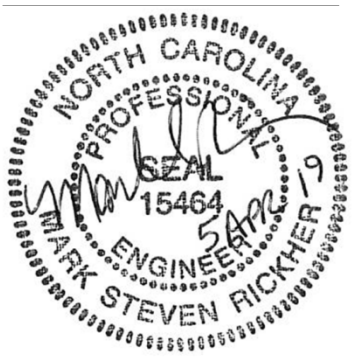

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DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

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

1.2 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for:

Consolidate Intensive Care Unit
Salem VA Medical Center, Salem, VA
VA Project #658-317

as required by drawings and specifications.

B. Visits to the site by Bidders may be made only by appointment with the Salem VA Medical Center Contracting Officer.

C. Offices of Atriax, PLLC, 102 3rd Ave., N.E., Hickory, North Carolina, 28601, 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 work days unless otherwise designated by the COR.

E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

1.3 STATEMENT OF BID ITEM(S)

A.BASE BID: Construct all work shown or specified within the drawings and specifications. This work is shown on the Phasing Plan, Sheet GI-102, Phase 1A Base Bid and Phase 2 Base Bid. Do not construct work shown on Phase 1B Base Bid nor the work on Bid Deduct #1. The scope of new work is the construction of approximately 10,115 sf of new ICU patient care space. The new construction extends the existing ICU space to the east, building the new space over the existing roof (Primary Care Clinic directly below). The renovation work consists of renovating/modifying approximately 5,500 sf of existing ICU for the co-location/consolidation of Intensive Care Units at the Medical Center.

The project will include, but is not limited to, site grading for a new exit stair tower, demolition/removal of existing structures and construction, general construction, electrical, mechanical/HVAC, plumbing, low voltage, and fire protection/fire alarm.

B.BID DEDUCT #1

Deduct all work associated with Phase 2 Base Bid (renovation work) as shown on the Phasing Plan, Sheet GI-102. Instead, Contractor shall construct Phase 1A Base Bid, Phase 1B Base Bid and Bid Deduct #1 (shell space).

CONTRACT COMPLETION TIME

C.The Base Bid project shall be completed within 720 calendar days after Notice to Proceed (NTP).

D.The Bid Deduct #1 project shall be completed within 540 calendar days after Notice to Proceed (NTP).

1.3 STATEMENT OF BID ITEM(S)

SECTION 1.3 DELETED IN ITS ENTIRETY AND REPLACED BY NEW TEXT ON 6-9-2026
SEE NEW PAGE ADDED TO SPEC 01 00 00 AFTER PAGE 1.

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. before starting work the General Contractor shall submit to the COR their security plan that defines both physical and administrative security procedures that will remain effective for the entire

duration of the project. No work can commence until the Security Plan is approved.

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

B. Security Procedures:

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

2. Before starting work the General Contractor shall give one week's notice to the COR 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. Guards: NOT USED

D. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the Contracting Officer's Representative for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.

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

E. Document Control:

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

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

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

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

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

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

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

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

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

F. Motor Vehicle Restrictions

The COR will designate a parking area for construction related vehicles on Medical Center property, however; parking is limited and not guaranteed by VA. The Medical Center anticipates that the contractor will provide transportation to the worksite for its employees and no parking for workers' personally owned vehicles will be available.

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 COR 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 and approved by the COR.

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

F. Execute work so as to interfere as little as possible with normal functioning of the Salem VA 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 periods of construction, either by medical center patients,

medical center personnel, and/or the Contractor's personnel, except as permitted by the 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 the Salem VA Medical Center in quantities sufficient for not more than two work days. Provide unobstructed access to all area of the Salem VA Medical Center as required to remain in full operation.
3. Where access by the Salem VA Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

G. Phasing:

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

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

Phase 1a: Date TBD by Contractor’s “accepted construction schedule”

Phase 1b: Date TBD by Contractor’s “accepted construction schedule”

Phase 2: Date TBD by Contractor’s “accepted construction schedule”

Phase 3: Date TBD by Contractor’s “accepted construction schedule”

Reference the project drawings for a delineation of the work associated with each Phase. See Sheet GI-102

H. Portions of Building 143 Intensive Care Unit will be vacated by Government in accordance with above phasing. The vacating of construction areas are to be coordinated with the COR.

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

I. Construction Fence: Before construction operations begin on the addition to the ICU the Contractor shall provide a chain link construction fence, 2.1m (seven feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by the COR.

J. When a building, portion of a building, and/or a construction site is turned over to Contractor, the 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 all existing fire protection and alarm equipment within the construction area. In connection with fire alarm equipment, the Contractor shall make

arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.

K. Utilities Services: Maintain existing utility services for the Salem VA 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, 14 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of the Salem VA Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.

4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.

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

6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, 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.

M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:

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

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

N. 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 the areas within Building 143 Intensive Care Unit in which alterations will occur and areas which are

anticipated routes of access, and furnish a report, signed by both the Contractor and COR 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 143.
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, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

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

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

Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

D. Protection: Provide the following protective measures:

1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.

2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.

3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 DISPOSAL AND RETENTION

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

1. Reserved items which are to remain property of the Government are to be identified by attached tags as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by the COR.

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

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 Salem VA Medical Center during the alteration period, such items which are NOT required to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

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

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

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

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

D. “Refer to FAR clause 52.236-7, "Permits and Responsibilities". The Salem VAMC operates under a General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems which requires regulation of construction activities with over 10,000 SF of land disturbance. This project does not include over 10,000 SF of land disturbance; however, construction means and methods with regard to the contractor accessing the construction site with the removal of existing materials during demolition, bringing new materials into the construction area, and the execution of the work shall be determined by

the contractor. While a Stormwater permit may not be required by this project, the Contractor shall strictly comply with all requirements set forth in the Salem VAMC General Permit and the approved Erosion and Sediment Control Plan. The Contractor is considered an "operator" under the permit and responsible for all compliance monitoring and reporting required by the permit for all stormwater discharges from the construction. VA will provide the contractor a copy of the General Permit and approved Erosion and Sediment Control Plan. Contractor shall pay all permitting fees. Contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:

a. Providing a certified Responsible Land Distributor (RLD) during all stages of construction, from the initial land disturbance through final site stabilization. Then name of the project RLD must be provided to the COR and Virginia DEQ before any land disturbance may begin. Notify COR and Virginia DEQ in a timely manner if the RLD changes during the course of the project.
b. Designating areas for equipment maintenance and repair;
c. Providing waste receptacles at convenient locations and provide regular collection of wastes;
d. Locating equipment wash down areas on site, and provide appropriate control of wash-waters;
e. Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
f. Providing adequately maintained sanitary facilities.”

1.10 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR. Existing work to be altered or extended and that is found to be

defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

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

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

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

1.11 PHYSICAL DATA

A. Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by:

ECS Mid Atlantic
7670 Enon Drive, #101
Roanoke, VA 24019

B. Subsurface conditions have been developed by core borings and test pits. Logs of subsurface exploration are shown diagrammatically on drawings.

C. A copy of the soil report will be made available for inspection by bidders upon request to the COR at the Salem VA Medical Center, and shall be considered part of the contract documents.

D. Government does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work and logs of borings; and, after investigation, decide for themselves character of materials and make their bids accordingly. Upon proper application to Department of Veterans Affairs, bidders will be permitted to make subsurface explorations of their own at site.

1.12 PROFESSIONAL SURVEYING SERVICES

A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. The Contractor shall certify that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

1.13 LAYOUT OF WORK

A. The Contractor shall lay out the work as indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

B. Establish and plainly mark center lines for each building and corner of column lines and/or addition to each existing building, and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for such structure and/or addition are in accordance with lines and elevations shown on contract drawings.

C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:

   1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the COR before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.

D. During progress of work the Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the COR before any major items of concrete work are placed. In addition, the Contractor shall also furnish to the COR certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.

   1. Lines of each addition.

   2. Elevations of bottoms of footings and tops of floors of each building and/or addition.

   3. Lines and elevations of sewers and of all outside distribution systems.

E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing

bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to the COR.

F. Upon completion of the work, the Contractor shall furnish the COR one electronic copy and reproducible drawings at the scale of the contract drawings, showing the finished grade on the grid developed for constructing the work. These drawings shall bear the seal of the registered land surveyor or registered civil engineer.

G. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.14 AS-BUILT DRAWINGS

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

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

C. Contractor shall deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.

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

1.15 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on the Salem VA Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.16 COR'S FIELD OFFICE (NOT REQUIRED)

1.17 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to written approval and compliance with the following provisions:

1. Permission to use each unit or system must be given by the COR 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.

6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to

prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government

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

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

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

1.18 TEMPORARY USE OF EXISTING ELEVATORS (NOT REQUIRED)

1.19 TEMPORARY USE OF NEW ELEVATORS (NOT REQUIRED)

1.20 TEMPORARY TOILETS

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

1.21 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.

1.22 NEW TELEPHONE EQUIPMENT

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

1.23 TESTS

A. As per specification 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 reasonably period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.

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

1.24 INSTRUCTIONS

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

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

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject

matter covers the expectations of the VA and the contractual requirements. The Salem VA Medical Center reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.25 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government-furnished property shown on contract drawings, Equipment Schedule, or identified in these Specifications.

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

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

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

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

E. Equipment furnished by the Government will be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e., couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to make the connection between the Government furnished equipment item and

the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.

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

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

1.26 RELOCATED EQUIPMENT/ITEMS (NOT REQUIRED)

1.27 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT (NOT REQUIRED)

1.28 CONSTRUCTION SIGN (NOT REQUIRED)

1.29 SAFETY SIGN (NOT REQUIRED)

1.30 PHOTOGRAPHIC DOCUMENTATION

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

1. Demonstrable minimum experience of three (3) years in operation providing documentation and advanced indexing/navigation systems including a representative portfolio of construction projects of similar type, size, duration and complexity as the Project.

2. Demonstrable ability to service projects throughout North America, which shall be demonstrated by a representative portfolio of active projects of similar type, size, duration and complexity as the Project.

B. Photographic documentation elements:

1. Each digital image shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) capable of producing 200x250mm (8 x 10 inch) prints with a minimum of 2272 x 1704 pixels and 400x500mm (16 x 20 inch) prints with a minimum 2592 x 1944 pixels.

2. Indexing and navigation system shall utilize actual AUTOCAD construction drawings, making such drawings interactive on an on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the project.

3. Documentation shall combine indexing and navigation system with inspection-grade digital photography designed to capture actual conditions throughout construction and at critical milestones. Documentation shall be accessible on-line through use of an internet connection. Documentation shall allow for secure multiple-user access, simultaneously, on-line.

4. Before construction, the building pad, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building pad and site shall be documented. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings. If site work or pad preparation is extensive, this documentation may be required immediately before construction and at several pre-determined intervals before building work commences.

5. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every thirty (30) calendar days ("Progressions"). Progression documentation shall track both the exterior and interior construction of the building. Exterior Progressions shall track 360 degrees around the site and each building. Interior Progressions shall track interior improvements beginning when stud work commences and continuing until Project completion.

6. As-built condition of pre-slab utilities and site utilities shall be documented prior to pouring slabs, placing concrete and/or backfilling. This process shall include all underground and in-slab utilities within the building(s) envelope(s) and utility runs in the immediate vicinity of the building(s) envelope(s). This may also include utilities enclosed in slab-on-deck in multi-story buildings. Overlapping photographic techniques shall be used to insure maximum

coverage. Indexing and navigation accomplished through interactive site utility plans.

7. As-built conditions of mechanical, electrical, plumbing and all other systems shall be documented post-inspection and pre-insulation, sheet rock or dry wall installation. This process shall include all finished systems located in the walls and ceilings of all buildings at the Project. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
8. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the COR in order to capture pre-determined focal points, such as waterproofing, window flashing, radiused steel work, architectural or Exterior Insulation and Finish Systems (EIFS) detailing. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive elevations or elevation details.
9. As-built finished conditions of the interior of each building including floors, ceilings and walls shall be documented at certificate of occupancy or equivalent, or just prior to occupancy, or both, as directed by the COR. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
10. Miscellaneous events that occur during any Contractor site visit, or events captured by the Department of Veterans Affairs independently, shall be dated, labeled and inserted into a Section in the navigation structure entitled “Slideshows,” allowing this information to be stored in the same “place” as the formal scope.
11. Customizable project-specific digital photographic documentation of other details or milestones. Indexing and navigation accomplished through interactive architectural plans.
12. Monthly (29 max) exterior progressions (360 degrees around the project) and slideshows (all elevations and building envelope). The slideshows allow for the inclusion of Department of Veterans Affairs

pictures, aerial photographs, and timely images which do not fit into any regular monthly photopath.

13. Weekly (21 Max) Site Progressions - Photographic documentation capturing the project at different stages of construction. These progressions shall capture underground utilities, excavation, grading, backfill, landscaping and road construction throughout the duration of the project.

14. Regular (8 max) interior progressions of all walls of the entire project to begin at time of substantial framed or as directed by the COR through to completion.

15. Detailed exact-built of all slabs for all project slab pours just prior to placing concrete or as directed by the COR.

16. Detailed Interior exact built overlapping photos of the entire building to include documentation of all mechanical, electrical and plumbing systems in every wall and ceiling, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by the COR.

17. Finished detailed Interior exact built overlapping photos of all walls, ceilings, and floors to be scheduled by the COR prior to occupancy.

18. In event a greater or lesser number of images than specified above are required by the COR, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

C. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.

D. Coordination of photo shoots is accomplished through the COR. Contractor shall also attend construction team meetings as necessary. Contractor’s operations team shall provide regular updates regarding the status of the documentation, including photo shoots concluded, the availability of new Progressions or Exact-Builts viewable on-line and anticipated future shoot dates.

E. Contractor shall provide all on-line domain/web hosting, security measures, and redundant server back-up of the documentation.

F. Contractor shall provide technical support related to using the system or service.

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

1.31 FINAL ELEVATION DIGITAL IMAGES

A. A minimum of four (4) images of each elevation shall be taken with a minimum 6 MP camera, by a professional photographer with different settings to allow the COR to select the image to be printed. All images are provided to the COR on a CD.

B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures. Pictures shall be 400 mm x

C. 500 mm (16 by 20 inches), printed on regular weight paper, matte finish archival grade photographic paper and produced by a RA4 process from the digital image with a minimum 300 PPI. Identifying data shall be carried on label affixed to back of photograph without damage to photograph and shall be similar to that provided for final construction photographs.

D. Furnish six (6) 400 mm x 500 mm (16 by 20 inch) color prints of the following buildings constructed under this project (elevations as selected by the COR from the images taken above). Photographs shall be artistically composed showing full front elevations. All images shall become property of the Government. Each of the selected six prints shall be place in a frame with a minimum of 2 inches of appropriate matting as a border. Provide a selection of a minimum of 3 different frames from which the SRE will select one style to frame all six prints.

E. Photographs with frames shall be delivered to the COR in boxes suitable for shipping.

1.32 HISTORIC PRESERVATION (NOT REQUIRED)

1.33 VA TRIRIGA CPMS (NOT REQUIRED)

- - - E N D - - -

SECTION 00 01 15
LIST OF DRAWING SHEETS

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

Drawing No.	Title
	GENERAL
GI001	COVER SHEET
GI004	U.L. DESIGN U411
GI005	U.L. DESIGN U411 CONT'D & U465
GI006	U.L. DESIGN U465 CONT'D
GI007	U.L. DESIGN U499
GI008	U.L. DESIGN U905
GI101	FIRST FLOOR LIFE SAFTEY PLAN
GI102	PHASING PLAN
	CIVIL
CS101	SITE LAYOUT
CS501	EROSION CONTROL NOTES AND DETAILS
	STRUCTURAL
S001	STRUCTURAL GENERAL NOTES
S002	STRUCTURAL GENERAL NOTES
S003	TYPICAL SECTIONS AND DETAILS
S100	FIRST FLOOR PLAN
S101	ROOF FRAMING PLAN
S102	EQUIPMENT ROOF PLAN
S401	FRAMING SECTIONS AND DETAILS
S402	FRAMING SECTIONS AND DETAILS
	ARCHITECTURAL
AD101	DEMOLITION PLANS
AE101	ICU FLOOR PLANS
AE102	ROOF PLAN
AE103	FIRST FLOOR REFLECTED CEILING PLAN
AE104	EQUIPMENT PLAN
AE201	EXTERIOR ELEVATIONS
AE400	TYPICAL MOUNTING HEIGHT DETAILS
AE401	ENLARGED PLANS AND ELEVATIONS
AE402	ENLARGED PLANS AND ELEVATIONS
AE403	ENLARGED PLANS AND ELEVATIONS
AE501	CEILING DETAILS – SEISMIC CATEGORY C
AE502	CEILING DETAILS
AE503	SMOKE, FIRE, JOINT DETAILS
AE601	DOOR SCHEDULE, ELEVATIONS AND DETAILS
AE602	SIGNAGE TYPE AND LOCATION PLAN
AE603	EQUIPMENT LIST
AE604	EQUIPMENT LIST
AE701	BUIDLING PROFILE SECTIONS
AE702	EXTERIOR SECTION DETAILS
AE703	EXTERIOR SECTION DETAILS

AE704	EXTERIOR SECTION DETAILS
AE705	EXTERIOR STAIR WALL DETAILS
AE801	WALL TYPES – INTERIOR
AE802	WALL TYPES EXT & MASONRY
AE901	STAIR PLANS & SECTIONS
AE902	STAIR DETAILS

INTERIORS

IN101	FIRST FLOOR FINISH PLANS
IN102	FIRST FLOOR WALL PROTECTION PLAN
IN501	FINISH LEGENDS, SCHEDULES, & NOTES

FIRE PROTECTION

FA101	FIRST FLOOR FIRE ALARM PLAN
FP101	FIRST FLOOR SPRINKLER PLAN

PLUMBING

P001	PLUMBING LEGENDS AND NOTES
PD101	FIRST FLOOR PLAN: PLUMBING DEMOLITION WASTE&VENT
PD102	FIRST FLOOR PLAN: PLUMBING DEMOLITION WATER
PD103	FIRST FLOOR PLAN: PLUMBING DEMOLITION MEDICAL GAS
PD104	BASEMENT FLOOR PLAN: PLUMBING DEMOLITION WASTE, VENT & STORM DRAIN
PL101	FIRST FLOOR PLAN: PLUMBING NEW WASTE & VENT
PL102	BASEMENT FLOOR PLAN: PLUMBING NEW WASTE, VENT & STORM DRAIN
PP100	FIRST FLOOR PLAN: PLUMBING WATER & MEDICAL GAS PLAN
PP101	FIRST FLOOR PLAN: PLUMBING NEW WATER
PP102	FIRST FLOOR PLAN: PLUMBING NEW MEDICAL GAS
PP301	ROOF PLAN: PLUMBING
PP401	ENLARGED PLUMBING PLANS
PP402	PLUMBING RISERS
PP403	PLUMBING PIPING PENETRATIONS PLAN
PP501	PLUMBING DETAILS
PP502	PLUMBING DETAILS
PP601	PLUMBING SCHEDULES

MECHANICAL

M001	MECHANICAL GENERAL NOTES, ABBREVIATIONS AND LEGEND
MD101	MECHANICAL - DEMOLITION
MH101	MECHANICAL DUCT FIRST FLOOR – NEW WORK
MP101	MECHANICAL PIPE FIRST FLOOR – NEW WORK
M301	MECHANICAL ROOF PLAN
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M503	MECHANICAL DETAILS
M504	MECHANICAL DETAILS
M601	MECHANICAL SCHEDULES
M602	MECHANICAL SCHEDULES
M701	MECHANICAL INSTRUMENTATION AND CONTROLS
M702	MECHANICAL INSTRUMENTATION AND CONTROLS

ELECTRICAL

E001	ELECTRICAL SYMBOL SCHEDULE AND NOTES
E002	PHASING PLAN
ED101	FLOOR PLAN - DEMOLITION
EL101	FLOOR PLAN - LIGHTING
EL401	ENLARGED FLOOR PLAN - LIGHTING
EL701	LIGHTING DETAILS
EP100	BASEMENT AND SUB-BASEMENT FLOOR PLANS – EQUIPMENT LOCATIONS & CONDUIT ROUTING
EP101	FLOOR PLAN - POWER
EP301	ROOF PLAN - POWER
EP401	ENLARGED FLOOR PLAN - POWER & COMMUNICATIONS
EP701	ELECTRICAL DETAILS
EP702	ELECTRICAL DETAILS
EY101	FLOOR PLAN - AUXILIARY SYSTEMS
EY701	COMMUNICATIONS DETAILS
E501	POWER RISER DIAGRAM - EXISTING
E502	POWER RISER DIAGRAM - NEW WORK
E601	LIGHT FIXTURE SCHEDULE
E602	PANEL SCHEDULES
E603	PANEL SCHEDULES

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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 (COR).

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

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

1.3 CONTRACTOR'S CONSULTANT:

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

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

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

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

1.4 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. The time/cost schedules and reports shall be submitted to the COR in electronic format and shall include: 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 listing of all project schedule changes, and associated data; and the resulting monthly updated schedule in PDM format. The time/cost schedules and reports must be submitted with and substantively support the contractor’s monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.

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

C. The VA will report errors in computer-produced reports to the Contractor’s representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports 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. After contract award, the Contractor shall submit for the Contracting Officer's review; the interim schedule using an anticipated Notice to Proceed date on an electronic file in the previously approved CPM schedule program. The submittal shall include 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 an electronic copy of the revised Project Schedule, the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be

reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

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

1.6 WORK ACTIVITY/EVENT COST DATA

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

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

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

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

1.7 PROJECT SCHEDULE REQUIREMENTS

A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:

1. Show activities/events as:
   a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
   b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
   c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
   d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
   e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.

B. The Contractor shall submit the following supporting data in addition to the project schedule:
   1. The appropriate project calendar including working days and holidays.
   2. The planned number of shifts per day.
   3. The number of hours per shift.

   Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.

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

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

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit an application and certificate for payment using VA Form 10-6001a or the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 – 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 – 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

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

1.9 PAYMENT AND PROGRESS REPORTING

A. Monthly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:

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

B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer’s representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

C. After completing the monthly schedule update, the contractor’s representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and COR 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 COR. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and

1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the COR within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

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

1.10 RESPONSIBILITY FOR COMPLETION

A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
   1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
   2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.

3. Reschedule the work in conformance with the specification requirements.

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

1.11 CHANGES TO THE SCHEDULE

A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:

1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
3. The schedule does not represent the actual prosecution and progress of the project.
4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.

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

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

D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as

specified in FAR 52.243 – 4 (Changes) and VAAR 852.236 – 88 (Changes – Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

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

1.12 ADJUSTMENT OF CONTRACT COMPLETION

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

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

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

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

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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 SDS 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. Project title, location and number.
2. 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.

1.6.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the

contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Internet-based submittal service shall be used for transmittal of all submittals, request for information (RFI), progress documentation, contract modification documents (e.g. change proposals, change orders), certified payrolls, daily reports, test reports, and any other document the COR wishes to make part of the project record.
2. Contractor and Architect are required to use this service.
3. It is Contractor's responsibility to submit documents in PDF format.
4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid for by the Contractor. Contractor shall include the cost of the service in the contract price.

C. Ownership: Set up ownership of the electronic submittal service account such that the Government is the sole owner and has full rights to the account. Coordinate with the Contracting Officer Representative to fulfill this requirement.

D. Submittal Service: The selected service is:

1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com.

E. Training: Selected service shall include web-based training sessions for Government, Contractor, and AE personnel.

F. Project Closeout: The Government shall determine when to terminate the

service for the project. Selected internet based service shall provide archived copies of all files to the Government as part of closeout.

1.7 SAMPLES

A. Submit two sets of physical samples showing range of variation, for each required item.

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

The 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 20 working days for submittals.

E. VA review period is 15 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. "Disapproved, 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.

G. Any rejected submittal should be re-submitted within 15 days.

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

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 Professionals (ASSP):

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

Z359.0-2012.....Definitions and Nomenclature Used for Fall Protection and Fall Arrest

Z359.1-2016.....The Fall Protection Code

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

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

D. The Facilities Guidelines Institute (FGI):

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

E. National Fire Protection Association (NFPA):

10-2018.....Standard for Portable Fire Extinguishers

30-2018.....Flammable and Combustible Liquids Code

51B-2019.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

70-2020.....National Electrical Code

70B-2019.....Recommended Practice for Electrical Equipment Maintenance

70E-2018 .....Standard for Electrical Safety in the Workplace

241-2019.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

703-2024.....Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials

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. US Army Corps of Engineers Safety and Occupational Health (SOH) Requirements Publication No. EM 385-1-1, 2024 edition

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. Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

D. Competent Person, Cranes and Rigging.

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures regarding such hazards.

E. Competent Person, Excavation/Trenching.

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

F. Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance

with ASSE/SAFE Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

G. Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

H. Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

I. High Risk Activities
High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

J. "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.

K. Qualified Person, Fall Protection (QP for FP)
A QP for FP is a person meeting the requirements of EM 385-1-1 Appendix Q, and ASSE/SAFE Z359.0, with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

L. USACE Property and Equipment
Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

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

N. Mishap: Mishap in this specification is defined according to the EM 385-1-1. A mishap is any unplanned, undesired event that occurs during the course of work being performed. This includes accidents, incidents, and near misses.

O. Mishap Criticality Categories

1. No impact/Near-Miss – near miss incidents that shall be investigated and reported to the VA within 24 hours.

2. Minor incident/impact – incidents that require first aid or result in minor equipment damage (less than $5000). These incidents must be investigated and reported to the VA within 24 hours.

3. Moderate incident/impact – Any work-related injury or illness that results in any of the following. These incidents must be investigated and are required to be reported to the VA within 2 hours.

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

   b. Restricted work;

   c. Transfer to another job;

   d. Medical treatment beyond first aid;

   e. Loss of consciousness;

   f. 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,

   g. any incident that leads to major equipment damage (greater than $5000).

4. 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.

J. Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

K. 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 physician or registered personnel.

1.3 SUBMITTAL REQUIRMENTS:

A. Government approval or concurrence is required for submittals with a "G" designation; submittals not having a "G" designation are submitted for information only.

B. Preconstruction Submittals

1. Accident Prevention Plan (APP); G

C. Reports

1. Monthly Contractor Health Safety and Environmental (HS&E) Performance Report; G
2. Notifications and Reports;
3. Mishap Reports;
4. Near-Miss Reports;
5. LHE Inspection Reports
6. Monthly Exposure Hour Reports;

D. Work Plans

1. Standard Lift Plan; G
2. Critical Lift Plan; G
3. Activity Hazard Analysis (AHA); G
4. Confined Space Entry Permit
5. Hot Work Permit
6. Radiography Operation Planning Work Sheet; G
7. Portable Gauge Operations Planning Worksheet; G

E. Certificates

1. Contractor Safety Self-Evaluation Checklist
2. Crane Operators/Riggers Certifications; G
3. Certificate of Compliance
4. Mobile Cranes Inspection Certificate
5. License Certificates
6. Machinery & Mechanized Equipment Certification Form

1.4 REGULATORY REQUIREMENTS:

A. In addition to the detailed requirements included in the provisions of this contract, comply with the most recent edition of USACE EM 385-1-1, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSP 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.

1.5 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 Mishap 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. Specifically articulating the safety requirements found within these VA contract safety specifications and the latest version of the United States Army Corps of Engineers – Safety and Occupational Health (SOH) Requirements - EM 385-1-1 Manual. Model language and format can be found in Appendix A of the EM 385-1-1 Manual

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

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

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

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

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

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

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

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

      1) Contractor;

      2) Contract number;

      3) Project name;

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

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

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

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

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

3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA or EM 385-1-1 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 Construction Outreach training within the past five years is required for all workers on site and the OSHA 30-hour Construction Outreach training within the past five years is required for Trade Competent Persons (CPs)

g. **SAFETY AND HEALTH INSPECTIONS.**

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

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

h. **MISHAP INVESTIGATION & REPORTING.**

1) The APP shall include identify person(s) responsible to provide the following to the Contracting Officer Representative :

a) Monthly HS&E Performance Report (Exposure Hours Data);

b) Mishap investigation reports;

c) Project site injury and illness logs;

d) Near-Miss reports;

i. **PLANS (PROGRAMS, PROCEDURES) REQUIRED.** Based on a risk assessment of contracted activities and on mandatory OSHA and/or EM 385-1-1 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 limited to procedures for addressing the risks associated 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 (LOTO);

14) Site-Specific Fall Protection & Prevention;

15) Excavation/trenching;

16) Asbestos abatement;

17) Lead abatement;

18) Crane Critical lift;

19) Respiratory protection;

20) Health hazard control program;

21) Radiation Safety Program;

22) Abrasive blasting;

23) Heat/Cold Stress Monitoring;

24) Crystalline Silica Monitoring (Assessment);

25) Demolition plan (to include engineering survey);

26) Formwork and shoring erection and removal;

27) Pre-Cast Concrete;

28) Public (Mandatory compliance with ANSI/ASSP A10.34-2012);

29) Sub-contractor or cross-trade coordination;

C. Submit the APP to the Contracting Officer Representative 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 safety conference for acceptance. Work cannot proceed without an accepted APP.

D. Once accepted by the Contracting Officer Representative, 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 2 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe

working conditions to safeguard onsite personnel, visitors, the public and the environment.

1.6 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 Contracting Officer Representative 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, EM 385-1-1, or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.

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

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

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

3. Submit AHAs to the Contracting Officer Representative 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 weekly) 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 Contracting Officer Representative or Government Designated Authority for review for compliance.

1.7 PRECONSTRUCTION SAFETY 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 pre-construction safety conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.

B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an

agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

1.8 SAFETY MEETINGS:

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

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

A. The Prime Contractor shall provide a Safety oversight team that includes a minimum of one (1) person at each project site, for each shift, to function as the Site Safety and Health Officer (SSHO). The Prime Contractor shall provide a minimum of one "Full-Time" SSHO at each project site, for each shift (with no other duties) that holds as current, a professional safety certification with at least 3 years of dedicated construction safety related experience. The SSHO shall ensure that the requirements of the VA and of 29 CFR 1926.16 are met for the project. The SSHO must be at the work site at all times, during construction activities, to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. If the SSHO is off-site for a period longer than 8 hours, or one shift, and not exceeding 40 hours, or 5 shifts, a pre-approved Alternate Safety Officer shall be provided and shall fulfill the same roles and responsibilities as the primary SSHO. The Alternate Safety Officer shall have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs. When the SSHO is temporarily (not to exceed 8 hours) off-

site, a Designated Representative (DR) from the Prime Contractors' staff, as identified in the AHA may be used in lieu of an Alternate Safety Officer and shall be on the project site, at all times, when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full-time occupation. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.

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

C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations). However, the SSHO has be a separate qualified individual from the Prime Contractor's Superintendent and/or Quality Control Manager with duties only as the SSHO

D. The SSHO or an equally qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

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

1.10 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.

B. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety Outreach class within the past five (5) years and:

1. Seven (7) years of construction industry safety related experience.

2. OR have a safety and health degree from an accredited university or college and five (5) years of construction industry safety related experience

3. OR hold as current, a Certified Safety Professional (CSP) or a Construction Health and Safety Technician (CHST) certification and five (3) years of construction industry safety related experience.

C. The Alternate Safety Officer shall meet, at a minimum, the requirements of EM 385-1-1 Section 1 and have five (5) years of construction industry safety experience If the SSHO does not have a current certification, certification must be obtained within 90 days, maximum, of contract award.

D. All designated CPs shall have completed the OSHA 30-hour Construction Safety course and/or EM 385-1-1 40-hour training within the past 5 years. In addition, all CPs with high hazard work operations (such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations) shall have a specialized formal course in the hazard recognition 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.

E. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course within the past 5 years and any necessary safety training to be able to identify hazards within their work environment.

F. Submit training records associated with the above training requirements to Contracting Officer Representative 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 safety conference for acceptance.

G. 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.

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

1.11 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 with a written report 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 Contracting Officer Representative.

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 shall be one that is not a part of the immediate site project team. The individual can be a corporate safety professional or independently contracted who is not an immediate member

of the construction project site team. 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 Contracting Officer Representative 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 Contracting Officer Representative within one week of the onsite inspection.

1.12 MISHAPS, OSHA 300 LOGS, AND EXPOSURE-HOURS:

A. The prime contractor shall establish and maintain a Near-Miss and Mishap 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 and provide an initial report to the Contracting Officer Representative as soon as practical, but no more than two hours after any Moderate or Major Mishap, High Visibility Incidents, or any weight handling and hoisting equipment mishap. No Impact/Near-Miss and Minor Mishaps shall be reported within 24 hours or as soon as practical. Within the notification the sender shall include contractor name; contract title; type of contract; name of activity, installation or location where mishap 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 mishap (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the Mishap site until the Contracting Officer Representative determines whether a government investigation will be conducted.

B. Conduct a mishap investigation for all Mishaps including mishaps resulting in at least $20,000 in damages without injury, to establish the root cause(s) of the mishap. The Mishap investigation shall include

images, 5 whys, the injured person's firsthand account, any witness accounts, methods of procedures, related AHA to the task, and corrective action plan signed by the president, vice president, or appropriate corporate-level leadership identified in the company's org chart for the project. Additionally, complete the VA Form 2162 (or equivalent) and provide the report to the Contracting Officer Representative within 7 calendar days of the accident. The Contracting Officer Representative will provide copies of any required or special forms.

C. A summation of all exposure-hours worked by the contractor and associated sub-contractors for each month will be reported to Contracting Officer Representative no later than the 10th day of the following month.

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 Contracting Officer Representative monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Contracting Officer Representative upon request.

1.13 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. Any PPE above and beyond the Mandatory PPE identified below and determined by the Contracting Officer or their Representative to be necessary in the performance of the Governments duties relative to this contract, shall be provided to the Government upon written notification by the Contracting Officer and at no additional expense to the Government. All PPE provided to the Government shall also be accompanied by any relevant or required training necessary to ensure its proper use.

C. Mandatory Minimum PPE includes:

1. Hard Hats – unless written authorization is given by the Contracting Officer Representative 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 and/or EM 385-1-1 regulations.

2. Safety glasses - unless written authorization is given by the Contracting Officer Representative 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 Contracting Officer Representative 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.

5. High-visibility Safety Apparel – appropriate brightly colored clothing that feature some type of reflective material on them, such as safety vests, shall be worn by personnel or visitors on construction sites.

1.14 PRE-CONSTRUCTION RISK ASSESSMENT

A. Control of all construction-associated hazards that affect VA medical facilities, their occupants, services and mission-essential functions and capabilities is critical in all medical center facilities. VHA Pre-Construction Risk Assessments (PCRAs) for construction, renovation and maintenance projects are included with this contract solicitation with required mitigations of identified hazards. VHA-PCRAs will be re-validated and updated as needed based on but not limited to changes from original designs, affected individuals, areas/locations, scope, contractor means and methods, safety requirements, phasing, contractor competencies and capabilities.

B. Infection Prevention and 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. A detailed analysis of potential risks for infectious disease transmission affecting the care, treatment or services of patients or residents has been conducted. VHA Infection Control Risk Assessments (ICRAs) are included with this contract solicitation with required mitigation actions/activities. VHA-ICRAs will be re-validated and updated as needed based on changes in original designs, affected individuals, area(s) or location(s), scope, contractor means and methods, infection prevention and control requirements, differing site conditions, phasing, contractor competencies and capabilities, and infectious disease outbreaks.

C. For work occurring at a VA medical facility, coordinate with the facility Safety Manager/Officer, as several aspects of this section directly relate to infection control risk assessments required in or adjacent to construction affecting occupied buildings accredited by The Joint Commission.

D. Products and Materials:

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

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

3. Dust proof One-hour drywall

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

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

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

7. Disinfectant: EPA-registered, Hospital-approved disinfectant or equivalent product

8. Portable Ceiling Access Module

1.15 DUST CONTROL

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

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

C. 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.

1.17 FIRE SAFETY

A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Contracting Officer Representative 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. For work occurring at a VA medical facility, coordinate with the facility Safety Manager/Officer, as several aspects of this section directly relate to interim life safety measures required in or adjacent to construction affecting occupied buildings accredited by The Joint Commission.

D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in

accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).

E. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or fire-retardant treated plywood (fire-retardant treated in accordance with NFPA 703) on both sides of fire-retardant treated wood framing or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.

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

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

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

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

H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Contracting Officer Representative.

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

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

K. Standpipes: Install and extend standpipes up with each floor in accordance with 29 CFR 1926 and NFPA 241. Do not charge wet standpipes subject to freezing until weather protected.

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

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

N. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Contracting Officer Representative.

O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Facility Safety Office. Obtain permits from facility Safety Manager at least _24___ hours in advance.

P. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Contracting Officer Representative.

Q. Smoking: Smoking and use of tobacco is prohibited on the entire Salem VAMC campus. Contractors are to maintain strict compliance with the prohibition on tobacco use.

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

FACILITY SAFETY OFFICE1.18 ELECTRICAL

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

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

C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance when achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards or is infeasible due to equipment design or operational limitations is energized work permitted. The Chief Engineer with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA and permit specific to energized work activities will be developed, reviewed, and accepted by the VA prior to the start of that activity.

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

2. Verification of the absence of voltage after de-energization and lockout/tagout is considered “energized electrical work” (live work) under NFPA 70E, and shall only be performed by qualified persons

wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.

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

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

E. Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125-volt, 15-, 20-, or 30-ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be implemented in accordance with NFPA 70E - 2015, Chapter 1, Article 110.4(C)(2).

1.19 FALL PROTECTION

A. The fall protection (FP) threshold height requirement is 4ft for ALL WORK in government occupied sites, unless the OSHA 29 CFR 1926 or EM 385-1-1 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work. For work occurring at new “greenfield” sites or sites with 24/7 Contractor controlled 100% restricted access, the fall protection (FP) threshold height may be increased to 6ft unless the OSHA 29 CFR 1926 or EM 385-1-1 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.

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

4. Fall protection while using a ladder will be governed by the more stringent of OSHA and EM 385-1-1 requirements.

1.20 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 4 ft as stated in Section 1.16.

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

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

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

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

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

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

1. The Competent Person's name and signature;

2. Dates of initial and last inspections.

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

1.21 EXCAVATION AND TRENCHES

A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P. Excavations less than 5 feet in depth require evaluation by the contractor's "Competent Person" (CP) for determination of the necessity of an excavation protective system where kneeing, laying in, or stooping within the excavation is required.

B. All excavations and trenches 24 inches in depth or greater shall require a written trenching and excavation permit (NOTE – some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall have two sections, one section will be completed prior to digging or drilling and the other will be completed prior to personnel entering the excavations greater than 5 feet in depth. Each section of the permit shall be provided to the Facility Safety Officer prior to proceeding with digging or drilling and prior to proceeding with entering the excavation. After completion of the work and prior to opening a new section of an excavation, the permit shall be closed out and provided to the Facility Safety Officer. The permit shall be maintained onsite, and the first section of the permit shall include the following:

1. Estimated start time & stop time

2. Specific location and nature of the work.

3. Indication of the contractor's "Competent Person" (CP) in excavation safety with qualifications and signature. Formal course in excavation safety is required by the contractor's CP.

4. Indication of whether soil or concrete removal to an offsite location is necessary.

5. Indication of whether soil samples are required to determined soil contamination.

6. Indication of coordination with local authority (i.e. "One Call") or contractor's effort to determine utility location with search and survey equipment.

7. Indication of review of site drawings for proximity of utilities to digging/drilling.

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

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetrometer will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5 Tons/FT2 – Type C, 0.5 Tons/FT2 to 1.5 Tons/FT2 – Type B, greater than 1.5 Tons/FT2 – Type A without condition to reduce to Type B).

2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.

3. Indication of the spoil pile being stored at least 2 feet from the edge of the excavation and safe access being provided within 25 feet of the workers.

4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.

C. As required by OSHA 29 CFR 1926.651(b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water

lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

1. The planned dig site will be outlined/marked in white prior to locating the utilities.
2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.
3. 811 will be called two business days before digging on all local or State lands and public Right-of Ways.
4. Digging will not commence until all known utilities are marked.
5. Utility markings will be maintained

D. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within 3 to 5 feet of identified underground utilities. Exploratory bar or other detection equipment will be utilized as necessary to further identify the location of underground utilities.

E. Excavations greater than 20 feet in depth require a Professional Engineer designed excavation protective system.

1.22 CRANES

A. All crane work shall comply with 29 CFR 1926 Subpart CC and EM 385-1-1.

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 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 by the Facility Safety Officer.

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 or more floors are vacated under the lift affected area AND a Contractor provided engineering analysis, performed by a Professional Engineer, demonstrates that overhead protection provided by the roof and vacated floors is sufficient to protect against the potential loss of a load being lifted or a minimum of 300 psf of protection is provided, whichever is greater

b. OR Overhead protection is designed by a Professional Engineer and installed over the roof by the Contractor to protect the occupants below. The installed system shall be sufficient to protect against the potential loss of a load being lifted or a minimum of 300 psf of protection is provided, whichever is greater.

c. OR A formal request may be submitted to the Contracting Officer for documentation, if available, indicating the roof of the building has been previously designed and constructed using a reinforced concrete roof slab or other means to provide overhead protection from construction activities specifically associated with the vertical or horizontal expansion of the same building AND a Contractor provided engineering analysis, performed by a Professional Engineer, demonstrates that overhead protection provided by the roof is sufficient to protect against the potential loss of a load being lifted or a minimum of 300 psf of protection is provided, whichever is greater.

1.23 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete & masonry equipment [1926.702(j)], heavy machinery & equipment [1926.600(a)(3)(i)], and

process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA 70E and other VA specific requirements discussed in the section.

1.24 CONFINED SPACE ENTRY

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

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

1.25 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Facility Safety Officer. Obtain permits from Facility Safety Officer at least _24___ hours in advance.

1.26 LADDERS

A. All Ladder use shall comply with 29 CFR 1926 Subpart X and EM 385-1-1.

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.

1.27 FLOOR & WALL OPENINGS

A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M and EM 385-1-1.

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

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

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

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

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

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

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

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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

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

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

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

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001
Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

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

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

AA Aluminum Association Inc.
http://www.aluminum.org

AABC Associated Air Balance Council
http://www.aabchq.com

AAMA American Architectural Manufacturer's Association
http://www.aamanet.org

AAN American Nursery and Landscape Association
http://www.anla.org

AASHTO American Association of State Highway and Transportation Officials
http://www.aashto.org

AATCC American Association of Textile Chemists and Colorists
http://www.aatcc.org

ACGIH American Conference of Governmental Industrial Hygienists
http://www.acgih.org

ACI American Concrete Institute
http://www.aci-int.net

ACPA American Concrete Pipe Association
http://www.concrete-pipe.org

ACPPA American Concrete Pressure Pipe Association
http://www.acppa.org

ADC Air Diffusion Council
http://flexibleduct.org

AGA American Gas Association
http://www.aga.org

AGC Associated General Contractors of America
http://www.agc.org

AGMA American Gear Manufacturers Association, Inc.
http://www.agma.org

AHAM Association of Home Appliance Manufacturers
http://www.aham.org

AIA	American Institute of Architects http://www.aia.org
AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction http://www.aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANLA	American Nursery & Landscape Association http://www.anla.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ASAE	American Society of Agricultural Engineers http://www.asae.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org

BHMA	Builders Hardware Manufacturers Association http://www.buildershardware.com
BIA	Brick Institute of America http://www.bia.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute http://www.eei.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.et1.com
FAA	Federal Aviation Administration http://www.faa.gov

FCC	Federal Communications Commission http://www.fcc.gov
FPS	The Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.cssinfo.com/info/gana.html/
FM	Factory Mutual Insurance http://www.fmglobal.com
GA	Gypsum Association http://www.gypsum.org
GSA	General Services Administration http://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org\
IMSA	International Municipal Signal Association http://www.imsasafety.org
IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. http://www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NAPHCC	Plumbing-Heating-Cooling Contractors Association http://www.phccweb.org.org

NBS	National Bureau of Standards See - NIST
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors http://www.nationboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association http://www.nema.org
NFPA	National Fire Protection Association http://www.nfpa.org
NHLA	National Hardwood Lumber Association http://www.natlhardwood.org
NIH	National Institute of Health http://www.nih.gov
NIST	National Institute of Standards and Technology http://www.nist.gov
NLMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879 (301) 670-0604
NSF	National Sanitation Foundation http://www.nsf.org
NWWDA	Window and Door Manufacturers Association http://www.nwwda.org
OSHA	Occupational Safety and Health Administration Department of Labor http://www.osha.gov
PCA	Portland Cement Association http://www.portcement.org
PCI	Precast Prestressed Concrete Institute http://www.pci.org
PPI	The Plastic Pipe Institute http://www.plasticpipe.org
PEI	Porcelain Enamel Institute, Inc. http://www.porcelainenamel.com

PTI	Post-Tensioning Institute http://www.post-tensioning.org
RFCI	The Resilient Floor Covering Institute http://www.rfci.com
RIS	Redwood Inspection Service See - CRA
RMA	Rubber Manufacturers Association, Inc. http://www.rma.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
SOI	Secretary of the Interior http://www.cr.nps.gov/local-law/arch_stnds_8_2.htm
IGMA	Insulating Glass Manufacturers Alliance http://www.igmaonline.org
SJI	Steel Joist Institute http://www.steeljoist.org
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org
SSPC	The Society for Protective Coatings http://www.sspc.org
STI	Steel Tank Institute http://www.steeltank.com
SWI	Steel Window Institute http://www.steelwindows.com
TCA	Tile Council of America, Inc. http://www.tileusa.com
TEMA	Tubular Exchange Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute, Inc. 583 D'Onofrio Drive; Suite 200 Madison, WI 53719 (608) 833-5900
UBC	The Uniform Building Code See ICBO

UL	Underwriters' Laboratories Incorporated http://www.ul.com
ULC	Underwriters' Laboratories of Canada http://www.ulc.ca
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Road, P.O. Box 23145 Portland, OR 97223 (503) 639-0651
WRCLA	Western Red Cedar Lumber Association P.O. Box 120786 New Brighton, MN 55112 (612) 633-4334
WWPA	Western Wood Products Association http://www.wwpa.org

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SECTION 01 45 00.00 10

QUALITY CONTROL

02/10

PART 1 GENERAL

1.1 REFERENCES

The publications 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.

ASTM INTERNATIONAL (ASTM)

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

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2012) International Building Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-12	(2006; Change 1) Engineering and Design -- Quality Management

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or lump-sum prices.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples:

SD-01 Preconstruction Submittals
Contractor Quality Control (CQC) Plan; G

PART 2 PRODUCTS: Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. Cover all construction design and construction operations, both onsite and offsite, and be keyed to the proposed construction design and construction

sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer 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 must maintain 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 QUALITY CONTROL PLAN

Submit no later than 15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 45 days of operation. Construction Design and 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 plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project manager.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. 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 be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.

e. Control, verification, and acceptance 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 must be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. 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 may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may 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.

j. Any special inspection requirements as required in accordance with ICC IBC

3.2.2 NOT USED

3.2.3 Acceptance of Plan

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

3.2.4 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or COR and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 15 calendar 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 CQC operations, 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 Contractor, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Site Safety and Health Officer must report directly to a senior project (or corporate) official independent from the CQC System Manager. The Site Safety and Health Officer 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 must maintain 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. 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 drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the

authority to act in all CQC matters for the Contractor. The CQC System Manager must be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 7 years construction experience on projects of similar size and type which include the major trades that are part of this contract. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, environmental, architectural, materials technician, submittals clerk. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals must have no other duties other than quality control. With the exception of the CQC Systems Manager, other CQC personnel may cover more than one area provided that they are qualified to perform QC activities in each designated and that workload allows.

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer with 2 years related experience or person 5 years of experience supervising civil features of work in the field with a construction company
Mechanical	Graduate Mechanical Engineer with 2 years related experience or person 5 years of experience supervising mechanical features of work in the field with a construction company
Electrical	Graduate Electrical Engineer with 2 years related experience or person 5 years of experience supervising electrical features of work in the field with a construction company
Structural	Graduate Structural Engineer with 2 years related experience or person 5 years of experience supervising structural features of work in the field with a construction company
Architectural	Graduate Architect with 2 years related experience or person 5 years of experience supervising architectural features of work in the field with a construction company

Environmental	Graduate Environmental Engineer with 2 years related experience or person 5 years of experience supervising environmental features of work in the field with a construction company
Submittals	Submittal Clerk with 2 year experience
Concrete, Pavements and Soils	Materials Technician with 2 years of experience for the appropriate feature of work
Testing, Adjusting and Balancing (TAB) Personnel	Specialist must be a member of AABC or an experienced technician of the firm certified by the NEBB

3.4.4 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager must have completed the course entitled "Construction Quality Management For Contractors". This course is periodically offered by the U.S. Army Corps of Engineers. (Course scheduling may be found via http://ulc.usace.army.mil/CQMLinks_Grid.aspx)

3.4.5 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 for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must 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 and Section 23 08 00 Commissioning of HVAC are included in the contract, the submittals required by those sections must be coordinated with 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

Contractor Quality Control 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 must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 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, reference 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/or equipment have been tested, submitted, and approved.
d. Review of provisions that have been made to provide required control inspection and testing.
e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
f. 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.
g. Review of the appropriate activity hazard analysis to assure safety requirements are met.
h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
j. Discussion of the initial control phase.
k. The Government must be notified at least 48 hours 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 as well as those actually performing the work. 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.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government must be notified at least 48 hours in advance of beginning the initial phase. 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 future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until 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.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going 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

3.7.1 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/or acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. 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 sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be 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. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

The listing of validated testing laboratories is available at http://gsl.erdc.usace.army.mil/SL/MTC/.

3.7.2.1 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 must meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck: NOT USED

3.7.3 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

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "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, as required by paragraph

DOCUMENTATION. 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.

3.8.2 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 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 must 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 completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from the Facility Management Service, the Architect-Engineer firm, and affected services may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer 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 scheduled for the final acceptance inspection.

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or 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:

a. Contractor/subcontractor and their area of responsibility.
b. Operating plant/equipment with hours worked, idle, or down for repair.
c. 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.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
g. Offsite surveillance activities, including actions taken.
h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
i. Instructions given/received and conflicts in plans and/or specifications.
j. NOT USED
k. Contractor's 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 within 24 hours 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 one report for every 7 days of no work and on the last day of a no work period. All calendar days must 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 must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

Additionally, provide interior and exterior webcams

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

Contractor Production Report
Contractor Quality Control Report
Deficiency List
Preparatory Phase Checklist
Initial Phase Checklist
Testing Plan and Log

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. 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 may 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.

-- End of Section --

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE: Enter Date (DD/MMM/YY)

CONTRACT NO: Enter Cnt# Here

TITLE AND LOCATION: Enter Title and Location of Construction Contract Here

REPORT NO: Enter Report # Here

CONTRACTOR: Enter The Contractor's Company Name Here

SUPERINTENDENT: Enter Superintendent's Name Here

AM WEATHER: Enter AM Weather Data Here

PM WEATHER: Enter PM Weather Data Here

MAX TEMP (F): Enter Max Temp Here

MIN TEMP (F): Enter Min Temp Here

WORK PERFORMED TODAY

Schedule Activity No.	WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes)	☐ YES	☐ NO
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report)	☐ YES	☐ NO
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/ HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.)	☐ YES	☐ NO
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.)	☐ YES	☐ NO

TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CON'T SHEETS	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
TOTAL WORK HOURS FROM START OF CONSTRUCTION	

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED	☐ SAFETY REQUIREMENTS HAVE BEEN MET.

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	Owner	Description of Construction Equipment Used Today (incl Make and Model)	Hours Used

Schedule Activity No.	REMARKS

CONTRACTOR/SUPERINTENDENT DATE

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE Enter (DD/MMM/YY)
REPORT NO Enter Rpt # Here

PHASE | CONTRACT NO Enter Cnt# Here | CONTRACT TITLE Enter Title and Location of Construction Contract Here

PREPARATORY

WAS PREPARATORY PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

INITIAL

WAS INITIAL PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)

Schedule Activity No.	Description

REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

Schedule Activity No.	Description

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep On-Site, etc.

Schedule Activity No.	Description

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

Schedule Activity No.	Description

GOVERNMENT QUALITY ASSURANCE MANAGER DATE

DEFICIENCY LIST

Contract No. and Title: Enter Contract # and Title Here

Contractor: Enter Contractor's Company Name Here

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

PREPARATORY PHASE CHECKLIST

(CONTINUED ON SECOND PAGE)

SPEC SECTION	DATE
Enter Spec Section # Here	Enter Date (DD/MMM/YY)

CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
Enter Cnt# Here	Enter DFOW Here	Enter Sched Act ID Here	Enter Index# Here

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

SUBMITTALS

REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES ☐ NO ☐

IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED?

ARE ALL MATERIALS ON HAND? YES ☐ NO ☐

IF NO, WHAT ITEMS ARE MISSING?

CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL. (THIS SHOULD BE DONE AS MATERIAL ARRIVES.)

COMMENTS:

MATERIAL STORAGE

ARE MATERIALS STORED PROPERLY? YES ☐ NO ☐

IF NO, WHAT ACTION IS TAKEN?

SPECIFICATIONS

REVIEW EACH PARAGRAPH OF SPECIFICATIONS.

DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK.

CLARIFY ANY DIFFERENCES.

PRELIMINARY WORK & PERMITS

ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.

IF NOT, WHAT ACTION IS TAKEN?

TESTING	IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM.
	WHEN REQUIRED?
	WHERE REQUIRED?
	REVIEW TESTING PLAN.
	HAS TEST FACILITIES BEEN APPROVED?
SAFETY	ACTIVITY HAZARD ANALYSIS APPROVED? YES ☐ NO ☐
	REVIEW APPLICABLE PORTION OF EM 385-1-1.
MEETING COMMENTS	NAVY/ROICC COMMENTS DURING MEETING.
OTHER ITEMS OR REMARKS	OTHER ITEMS OR REMARKS:

QC MANAGER DATE

INITIAL PHASE CHECKLIST

SPEC SECTION	DATE
Enter Spec Section # Here	Enter Date (DD/MMM/YY)

CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
Enter Cnt# Here	Enter DFOW Here	Enter Sched Act ID Here	Enter Index# Here

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

PROCEDURE COMPLIANCE

IDENTIFIY FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY. COORDINATE PLANS, SPECIFICATIONS, AND SUBMITTALS.

COMMENTS: _____

PRELIMINARY WORK

ENSURE PRELIMINARY WORK IS COMPLETE AND CORRECT. IF NOT, WHAT ACTION IS TAKEN?

WORKMANSHIP

ESTABLISH LEVEL OF WORKMANSHIP.

WHERE IS WORK LOCATED? _____

IS SAMPLE PANEL REQUIRED? YES ☐ NO ☐

WILL THE INIITAL WORK BE CONSIDERED AS A SAMPLE? YES ☐ NO ☐

(IF YES, MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE AND DESCRIBE LOCATION OF SAMPLE) _____

RESOLUTION

RESOLVE ANY DIFFERENCES.

COMMENTS: _____

CHECK SAFETY

REVIEW JOB CONDITIONS USING EM 385-1-1 AND JOB HAZARD ANALYSIS

COMMENTS: _____

OTHER

OTHER ITEMS OR REMARKS

_____

QC MANAGER DATE

TESTING PLAN AND LOG

CONTRACT NUMBER			PROJECT TITLE AND LOCATION							CONTRACTOR	
Enter Contract # Here			Enter Contract Title and Location Here							Enter Contractor's Company Name Here	
SPECIFICATION SECTION AND PARAGRAPH NUMBER	ITEM OF WORK	TEST REQUIRED	ACCREDITED/ APPROVED LAB		SAMPLED BY	TESTED BY	LOCATION OF TEST		DATE COMPLETED	DATE FORWARDED TO CONTR. OFF.	REMARKS
			YES	NO			ON SITE	OFF SITE			

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided 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.

C. American Concrete Institute (ACI):

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

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

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

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

A490-12.....Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

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

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

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

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

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

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

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

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

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

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

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

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

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

E. American Welding Society (AWS):

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

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory’s scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the

requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the “Corporate Office.”

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

C. Written Reports: Testing laboratory shall submit test reports to COR, Contractor, unless other arrangements are agreed to in writing by the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the COR regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to COR extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.

2. Provide full time observation of fill placement and compaction and field density testing in building areas and provide full time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.

3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D6938 wherever possible. Field density tests utilizing ASTM D1556 shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the COR before the tests are conducted.

    a. Building Slab Subgrade: At least one test of subgrade for every 185 m^2 (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m^2 (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
    b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
    c. Pavement Subgrade: One test for each 335 m^2 (400 square yards), but in no case fewer than two tests.
    d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
    e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
    f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to COR. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed

soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.

C. Fill and Backfill Material Gradation: One test per 50 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D1140.

D. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.

E. Testing Materials: Test suitability of on-site and off-site borrow as directed by COR.

3.2 NOT USED

3.3 NOT USED:

3.4 LANDSCAPING:

A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.

1. Test for organic material by using ASTM D2974.
2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.

B. Submit laboratory test report of topsoil to COR.

3.5 NOT USED:

3.6 SITE WORK CONCRETE:

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.7 NOT USED

3.8 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of COR with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by COR.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to COR.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.

5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

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

be air-entrained, test every 80 m^3 (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.

6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
    a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
    b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:

a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
b. Inspect preparation of construction, expansion, and isolation joints.

16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
17. Observe concrete mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.
18. Measure concrete flatwork for levelness and flatness as follows:
    a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
    c. Provide the Contractor and the COR with the results of all profile tests, including a running tabulation of the overall F_F and F_L values for all slabs installed to date, within 72 hours after each slab installation.
19. Other inspections:
    a. Grouting under base plates.
    b. Grouting anchor bolts and reinforcing steel in hardened concrete.

C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by COR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to COR. In test report, indicate the following information:
    a. Cylinder identification number and date cast.
    b. Specific location at which test samples were taken.

c. Type of concrete, slump, and percent air.
d. Compressive strength of concrete in MPa (psi).
e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
f. Weather conditions during placing.
g. Temperature of concrete in each test cylinder when test cylinder was molded.
h. Maximum and minimum ambient temperature during placing.
i. Ambient temperature when concrete sample in test cylinder was taken.
j. Date delivered to laboratory and date tested.

3.9 REINFORCEMENT:

A. Review mill test reports furnished by Contractor.

3.10 NOT USED:

3.11 NOT USED:

3.12 NOT USED:

3.13 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.

3.14 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. Welding Radiographic Testing: Test in accordance with ASTM E94, and AWS D1.1 for 5 percent of all full penetration welds at random.
i. Verify that correction of rejected welds are made in accordance with AWS D1.1.
j. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.

2. Bolt Inspection:
a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.

e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.

f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.

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

3.15 STEEL DECKING:

A. Provide field inspection of welds of metal deck to the supporting steel, and testing services to insure steel decking has been installed in accordance with contract documents and manufacturer’s requirements.

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with “Welder Qualification” procedures of AWS D1.1. Refer to the “Plug Weld Qualification Procedure” in Part 3 “Field Quality Control.”

C. Submit inspection reports, certification, and instances of noncompliance to COR.

3.16 NOT USED

3.17 SPRAYED-ON FIREPROOFING:

A. Provide field inspection and testing services to certify sprayed-on fireproofing has been applied in accordance with contract documents.

B. Obtain a copy of approved submittals from COR.

C. Use approved installation in test areas as criteria for inspection of work.

D. Test sprayed-on fireproofing for thickness and density in accordance with ASTM E605.

1. Thickness gauge specified in ASTM E605 may be modified for pole extension so that overhead sprayed material can be reached from floor.

E. Location of test areas for field tests as follows:

1. Thickness: Select one bay per floor, or one bay for each 930 m^2 (10,000 square feet) of floor area, whichever provides for greater number of tests. Take thickness determinations from each of following locations: Metal deck, beam, and column.

2. Density: Take density determinations from each floor, or one test from each 930 m^2 (10,000 square feet) of floor area, whichever

provides for greater number of tests, from each of the following areas: Underside of metal deck, beam flanges, and beam web.

F. Submit inspection reports, certification, and instances of noncompliance to COR.

3.18 NOT USED

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Effect other species of importance to humankind, or;
4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:

1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

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

1.2 QUALITY CONTROL

A. Establish and maintain quality control for the environmental protection of all items set forth herein.

B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

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

B. U.S. National Archives and Records Administration (NARA):
33 CFR 328.....Definitions

1.4 SUBMITTALS

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

e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.

f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.

g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.

h. Permits, licenses, and the location of the solid waste disposal area.

i. Environmental Monitoring Plans for water, air, and noise.

j. Paragraph Not Used

B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

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

B. Protection of Land Resources: Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.

1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Virginia Air Pollution Statue, Rules, and/or Regulations, and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
5. Fumes: AHU must be turned off and lift units turned off whenever there is a possibility of diesel fumes being pulled into building through AHU. Coordinate AHU down-time with COR prior to outage.

E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise only as reviewed and approved by the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

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

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

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

   b. Use shields or other physical barriers to restrict noise transmission.
   c. Provide soundproof housings or enclosures for noise-producing machinery.
   d. Use efficient silencers on equipment air intakes.

e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.

f. Line hoppers and storage bins with sound deadening material.

g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.

F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

DESCRIPTION

This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

A. Fabricate from 50 Kg (110 pound) mat finish white paper.

B. Cut to 100 mm (4-inch) wide by 300 mm (12 inch) long size tag.

C. Punch 3 mm (1/8-inch) diameter hole centered on 100 mm (4-inch) dimension of tag. Edge of Hole spaced approximately 13 mm (1/2-inch) from one end on tag.

D. Reinforce hole on both sides with gummed cloth washer or other suitable material capable of preventing tie pulling through paper edge.

E. Ties: Steel wire 0.3 mm (0.0120-inch) thick, attach to tag with twist tie, leaving 150 mm (6-inch) long free ends.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install temporary signs attached to room door frame or room door knob, lever, or pull for doors on corridor openings.

B. Mark on signs with felt tip marker having approximately 3 mm (1/8-inch) wide stroke for clearly legible numbers or letters.

C. Identify room with numbers as designated on floor plans.

3.2 LOCATION

A. Install on doors that have room, corridor, and space numbers shown.

B. Doors that do not require signs are as follows:

1. Corridor barrier doors (cross-corridor) in corridor with same number.
2. Folding doors or partitions.
3. Toilet or bathroom doors within and between rooms.
4. Communicating doors in partitions between rooms with corridor entrance doors.
5. Closet doors within rooms.

C. Replace missing, damaged, or illegible signs.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

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

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

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

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

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

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

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

C. Not Used

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:

1. Excess or unusable construction materials.
2. Packaging used for construction products.
3. Poor planning and/or layout.
4. Construction error.
5. Over ordering.
6. Weather damage.
7. Contamination.
8. Mishandling.
9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.

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

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

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to

be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.

C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.

D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.

E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).

F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.

H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.

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

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

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

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

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

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

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

1.5 SUBMITTALS

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

B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
   1. Procedures to be used for debris management.
   2. Techniques to be used to minimize waste generation.
   3. Analysis of the estimated job site waste to be generated:
      a. List of each material and quantity to be salvaged, reused, recycled.
      b. List of each material and quantity proposed to be taken to a landfill.
   4. Detailed description of the Means/Methods to be used for material handling.
      a. On site: Material separation, storage, protection where applicable.
      b. Off site: Transportation means and destination. Include list of materials.
         1) Description of materials to be site-separated and self-hauled to designated facilities.
         2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
      c. The names and locations of mixed debris reuse and recycling facilities or sites.
      d. The names and locations of trash disposal landfill facilities or sites.
      e. Documentation that the facilities or sites are approved to receive the materials.

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

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

1.6 APPLICABLE PUBLICATIONS

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

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

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 COLLECTION

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

3.2 DISPOSAL

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

3.3 REPORT

A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.

C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

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

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

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

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

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

and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

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

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

1.2 CONTRACTUAL RELATIONSHIPS

A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the COR 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 COR 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 COR 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 COR.

C. Not used

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 COR. 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 COR 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 COR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or COR will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the COR 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 COR with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.3 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. NOT USED

C. NOT USED

D. Section 01 32.16.15 PROJECT SCHEDULES (SMALL PROJECTS - DESIGN/BID/BUILD)

E. NOT USED

F. NOT USED

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

H. NOT USED

I. NOT USED

J. NOT USED

K. Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.

L. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

M. Section 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS.

N. Section 27 08 00 COMMISSIONING OF COMMUNICATIONS SYSTEMS.

O. Section 28 08 00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS.

P. NOT USED

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
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning

List of Acronyms	
Acronym	Meaning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery
NCA	Department of Veterans Affairs National Cemetery Administration
NEBB	National Environmental Balancing Bureau
O&M	Operations & Maintenance
OPR	Owner’s Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
TAB	Test Adjust and Balance
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management
VACO	VA Central Office
VA PM	VA Project Manager
USGBC	United States Green Building Council

1.6 DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Commissioning Process: A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and

documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

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

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

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

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

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

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

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

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

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

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

Deficiency: See "Commissioning Issue".

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

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

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

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

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

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

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

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

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

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

Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

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

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

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

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

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

Peer Review: A formal in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning

review. The VA usually hires an independent third-party (called the IDIQ A/E) to conduct peer reviews.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Unresolved Commissioning Issue: Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by

the VA. Validation: The process by which work is verified as complete and operating correctly:

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

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

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

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

Whole Building Commissioning: Commissioning of building systems such as Building Envelope, HVAC, Electrical, Special Electrical (Fire Alarm, Security & Communications), Plumbing and Fire Protection as described in this specification.

1.7 SYSTEMS TO BE COMMISSIONED

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

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

Systems To Be Commissioned	
System	**Description**
HVAC	
Noise and Vibration Control	Noise and vibration levels for critical equipment such as Air Handlers, etc. 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 Ventilation/Exhaust Systems	General exhaust, toilet exhaust,
HVAC Terminal Unit Systems**	VAV Terminal Units, CAV terminal units,
Electrical	
Grounding & Bonding Systems	Witness 3rd party testing, review reports
Electrical System Protective Device Study	Review reports, verify field settings consistent with Study
Low-Voltage Distribution System	Normal power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, switchboards, distribution panels, panelboards, verify breaker testing results (injection current, etc)
Lighting	Emergency lighting, occupancy sensors
Communications	
Grounding & Bonding System	Witness 3rd party testing, review reports

Systems To Be Commissioned	
System	**Description**
Structured Cabling System	Witness 3rd party testing, review reports
Master Antenna Television System	Witness 3rd party testing, review reports
Public Address & Mass Notification Systems	Witness 3rd party testing, review reports
Intercom & Program Systems	Witness 3rd party testing, review reports
Nurse Call & Code Blue Systems	Witness 3rd party testing, review reports
Security Emergency Call Systems	Witness 3rd party testing, review reports
Duress Alarm Systems	Witness 3rd party testing, review reports
Electronic Safety and Security	
Grounding & Bonding	Witness 3rd party testing, review reports
Physical Access Control Systems	Witness 3rd party testing, review reports
Access Control Systems	Witness 3rd party testing, review reports
Security Access Detection Systems	Witness 3rd party testing, review reports
Video Surveillance System	Witness 3rd party testing, review reports
Electronic Personal Protection System	Witness 3rd party testing, review reports
Fire Detection and Alarm System	Verify system monitoring, verify interface with other systems.

1.8 COMMISSIONING TEAM

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

B. Members Appointed by Contractor:

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

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

1.9 VA'S COMMISSIONING RESPONSIBILITIES

A. Appoint an individual, company or firm to act as the Commissioning Agent.
B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
1. Coordination meetings.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Testing meetings.
4. Witness and assist in Systems Functional Performance Testing.
5. Demonstration of operation of systems, subsystems, and equipment.

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

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

A. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.
B. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and

that subcontractors comply with the requirements of these specifications.

C. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
   1. Participate in commissioning coordination meetings.
   2. Conduct operation and maintenance training sessions in accordance with approved training plans.
   3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
   4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
   5. Review and comment on commissioning documentation.
   6. Participate in meetings to coordinate Systems Functional Performance Testing.
   7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
   8. Provide information to the Commissioning Agent for developing commissioning plan.
   9. Participate in training sessions for VA's operation and maintenance personnel.
   10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

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

C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.
D. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.
E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
F. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.
G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
H. Coordinate Systems Functional Performance Testing schedule with the Contractor.
I. Witness selected systems startups.
J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
K. Witness and document Systems Functional Performance Testing.
L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents.

Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00 GENERAL REQUIREMENTS.

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

O. Prepare commissioning Field Observation Reports.

P. Prepare the Final Commissioning Report.

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

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

1.12 COMMISSIONING DOCUMENTATION

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

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

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

B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed

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

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

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

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

Construction Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		COR = Contracting Officer's Representative					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	COR	A/E	PC	O&M	Notes
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	L	A	R	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	L	A	R	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	
	Issues Resolution Meetings	P	A	P	L	O	

Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Technical Activities							
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

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

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Pre-Test Coordination Meeting	L	A	P	P	O	

Acceptance Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		COR = Contracting Officer's Representative 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	COR	A/E	PC	O&M	Notes
	Lessons Learned and Commissioning Report Review Meeting	L	A	P	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	L	P	P	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Review Operations & Maintenance Manuals	L	A	R	R	R	
	Training Plan Review	L	A	R	R	R	
	Warranty Review	L	A	R	R	O	
	Review TAB Report	L	A	R	R	O	

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	Notes
Site Observations	Construction Observation Site Visits	L	A	R	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	P	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

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		COR = Contracting Officer's Representative 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	COR	A/E	PC	O&M	Notes
Meetings	Post-Occupancy User Review Meeting	L	A	O	P	P	
Site Observations	Periodic Site Visits	L	A	O	O	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	

Warranty Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		COR = Contracting Officer's Representative 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	COR	A/E	PC	O&M	Notes
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 Work Station located within the engineer’s office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from

the operator or maintenance personnel within a normal work shift, and not immediate action.

3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

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

D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the COR 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 COR. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the COR, 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.

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

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

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the COR 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 COR, 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 22, Division 23, Division 26, Division 27, and Division 28 sections. The Training and Demonstration shall include, but is not limited to, the following:
   1. Review the Contract Documents.
   2. Review installed systems, subsystems, and equipment.
   3. Review instructor qualifications.
   4. Review instructional methods and procedures.
   5. Review training module outlines and contents.
   6. Review course materials (including operation and maintenance manuals).
   7. Review and discuss locations and other facilities required for instruction.
   8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
   9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

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

a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
b. Video Format: Provide high quality color DVD color on standard size DVD disks.
c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
e. Submit two copies within seven days of end of each training module.

6. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

D. Quality Assurance:

1. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
2. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
3. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

E. Training Coordination:

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

F. Instruction Program:

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
   a. Fire protection systems, including fire alarm.
   b. Not used
   c. Not usedd. Medical equipment, including medical gas equipment and piping.
   e. Not usedf. Not used.
   g. Refrigeration systems, including chillers, pumps, and distribution piping.
   h. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.
   i. HVAC instrumentation and controls.
   j. Electrical service and distribution, including switchgear, transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
   k. Transfer switches.
   l. Lighting equipment and controls.
   m. Communication systems, including intercommunication, surveillance, nurse call systems, public address, mass evacuation, voice and data, and entertainment television equipment.
   n. Not used

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

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

h. Normal shutdown instructions.

i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.

b. Checking adjustments.

c. Noise and vibration adjustments.

d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.

b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.

b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.

d. Procedures for routine cleaning

e. Procedures for preventive maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.

b. Repair instructions.

c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

H. Training Execution:

1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.

2. Instruction:

a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.

b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2) The VA will furnish an instructor to describe VA's operational philosophy.

3) The VA will furnish the Contractor with names and positions of participants.

3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.

4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.

5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

I. Demonstration and Training Recording:

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.

2. Video Format: Provide high quality color DVD color on standard size DVD disks.

3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

----- END -----

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies demolition and removal of portions of buildings, mechanical and electrical items, and debris.

1. Contractor shall be responsible for all demolition required to complete the finished work as defined within the Contract Documents.
2. Existing construction to be removed:
   a. Contractor shall remove all construction designated and/or shown to be removed to receive new work as herein indicated completely.
   b. Fire protection, plumbing, mechanical, and electrical trades shall remove all devices and items pertaining to their respective trades from all existing partitions, ceilings, and the like being removed. Coordinate demolition with concurrent general demolition. Unless noted to be abandoned, fire protection, plumbing, mechanical and electrical items that pass through or are affected by the demolition shall be maintained in a complete and fully operational condition or, where noted, be appropriately capped off. Provide temporary systems as required to maintain full operation outside the area of demolition for any and all systems.

1.2 RELATED WORK:

A. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).

B. Disconnecting mechanical and electrical 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 017419 CONSTRUCTION WASTE MANAGEMENT.

E. Infectious Control: Section 01 35 26, SAFETY REQUIREMENTS, Article 1.12, INFECTION CONTROL.

F. Firestopping: Section 07 84 00, FIRESTOPPING.

1. If during the course of construction, missing and/or damaged fireproofing is observed on the existing structure, replace it to

match the existing fire-resistance rating for the structural component.

2. Openings in fire-resistance-rated/smoke walls shall be closed with an appropriate firestopping system. For openings left as a result of conduit and/ or cable removal, repair as necessary to match existing wall construction.

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, mechanical and electrical items, and structures or interruption of use of such mechanical and electrical items; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

1. Perform demolition work with "due care and diligence" so as to prevent the arbitrary destruction or interruption of concealed utilities which are intended to remain in use and the routing of which could not be predetermined until demolition was started. All such discoveries of utilities during the demolition process which are in a location different from that indicated, change direction from floor to floor, and the like, or are unidentified shall be reported to the COR before removal.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.

E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

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

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 Resident Engineer’s approval.

1. See Drawings for extent of cutting and patching requirements necessitated by each portion of the Work, such as structural, fire protection, plumbing, mechanical, electrical, and vendor equipment drawings (and the like).
2. See structural, fire protection, plumbing, mechanical, electrical, and vendor equipment drawings for additional work that may require ceiling access for special systems such as smoke/fire alarm, random junction boxes, and the like, which have not been indicated on the reflected ceiling or demolition plans. Indicate this work on the Coordination Drawings.

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 35 26, SAFETY REQUIREMENTS, Part-1 Article entitled “INFECTION CONTROL.”

1.4 UTILITY SERVICES (SEE CIVIL DRAWINGS)

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.0 EXAMINATION

A. In areas requiring new work and patching, verify existing finishes shown on the room finish information drawings and/or schedule. Immediately call any discrepancies to the COR's attention. New floor, base, wainscot, wall, and ceiling finishes shall match the existing finishes, unless otherwise noted.

1. Refer to the room finish information drawings and/or schedule for additional information concerning finishes which impact the work.
2. For existing ceiling patching, where ceiling is cut out or portions removed for removal of existing devices or installation of new work, the disturbed portion shall be patched to match the existing ceiling finish. Unless otherwise noted, the entire ceiling area is to be repainted where ceilings are gypsum board or plaster.
3. Where new finishes are applied to existing, the existing finishes shall be removed and/or the existing surfaces prepared as required to receive new finishes, unless otherwise noted. Where required to accommodate the new finishes, the mechanical, plumbing, and electrical trades shall disconnect and remove their respective devices and items from the existing wall, ceiling and/or floor and relocate to their final position in the new construction. Such devices shall include but not be limited to electrical switches, panels, outlets, thermostats, grills, plumbing fixtures, medical gas outlets, and the like. The respective trade shall also be responsible for any permanent connections of those items which are relocated.
4. In areas that have an existing flush floor finish of quarry tile or ceramic tile and are noted to receive a resilient floor tile or sheet vinyl finish, the ceramic/quarry tile shall be removed along with any loose setting bed material, and the area shall be leveled with self-leveling cement-based underlayment in preparation for the new finish.

5. In areas that have an existing floor finish of resilient floor tile or carpet and are to receive a new ceramic tile floor, the flooring and adhesive shall be removed in preparation for such new hard tile.
6. When carpet is to be removed it shall be wetted with an USEPA- and Owner-approved germicidal agent prior to the removal of the carpet to prevent the dispersion of airborne particles.
7. Plaster walls in an existing building that are to receive ceramic wall tile shall have the plaster removed from existing walls to the height of the new ceramic wall tile in preparation for the new setting bed and cement board shall be installed and prepared in accordance with the manufacturer’s written instructions.
8. Plaster or gypsum wallboard walls in an existing building from which vinyl wall fabric is removed, shall be cleaned of all adhesive and a skim coat of plaster shall be applied to receive the new finish.
9. In rooms scheduled to receive new finishes or millwork that is to receive new finishes, existing fixtures, devices, hardware, and accessories shall be temporarily removed as required to allow the new finish to extend under or behind the fixture or accessory and then reset.

3.1 DEMOLITION:

A. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

B. Remove and legally dispose of all materials, other than earth to remain as part of project work. Materials removed shall become property of Contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this Section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be

handled as unforeseen. The removal of hazardous material shall be abated by a licensed abatement contractor under an allowance, with Hazardous Materials specifications negotiated separately with the Owner.

1. Exception: Televisions, monitors by Philips, Essentris dialysis boxes by Clinicomp, patient lifts, fire extinguisher systems, and emergency chair evacuation systems shall be turned over to the Owner and stored where directed. Items that the Owner does not want to keep shall be removed and properly disposed of by the Contractor.
2. When patching slabs-on-grade or exterior walls, replace vapor barrier, water and/or air barriers if present to match the location of the existing vapor, water and/or air barriers and tape or provide other fasteners necessary to make the existing and new barrier consistent with the original barrier.
3. Remove portions of existing construction as designated and/or shown and patch remaining surfaces to match the adjacent construction.
4. Where indicated, remove existing door and frame and seal wall opening with construction to match the adjacent wall, unless otherwise noted. Finish wall to match the adjacent finish or to receive new finishes as scheduled.
5. Where indicated, remove existing window and seal opening with wall construction to match the adjacent wall, unless noted otherwise. Finish wall to match the adjacent finish or to receive new finishes as scheduled.
6. Remove existing cabinetwork as indicated. Where there is plumbing involved, such plumbing shall be removed back to active piping and capped at tee. Patch disturbed wall, ceiling and floor surfaces to match adjacent surfaces or provide new finishes scheduled. See notes on plumbing drawings for more information.

C. Remove existing mechanical and electrical items as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific mechanical and electrical item and approved by COR. When mechanical or electrical lines are encountered that are not indicated on the Drawings, the COR shall be notified prior to further work in that area.

1. Whenever existing equipment, piping, ducts, and the like, are required to be removed, such removal shall include all anchors,

hangers, foundations, and the like. After removal, any affected construction and surfaces such as floors, walls, bases, and ceilings shall be finished to match adjacent surfaces, unless otherwise noted.

2. Conduit should be removed back to the panel of origin if not used, unless used to feed other area. Unused conductors shall be removed back to the panel.
   a. Exception: Conduit stubs abandoned-in-place due to the nature of the existing structural shall be capped and/or plugged with an appropriately used device or approved firestopping system.
3. Remove abandoned electrical wire and/ or cables back to their point of origin. Data cable shall be pulled back to the data room of origin by the Contractor. Facility IT personnel shall disconnect cables from operational network equipment. Coordinate with facilities staff.
4. Completed runs of empty electrical conduits designated as "spare" shall not be removed.

3.2 CLEAN-UP:

A. On completion of work of this Section and after removal of all debris, leave Project site in clean condition satisfactory to COR. Clean-up shall include removal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations. Such materials, debris, and rubbish shall be disposed of off-site in a legal manner.
   1. Existing areas, whether within or outside the limits of the Contract, shall be repaired where any damage has occurred due to construction.

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SECTION 03 30 53
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete for metal pan stair fill.
   2. Footings.
   3. Equipment pads.
   4. Preparation of existing surfaces to receive concrete.
   5. Preparation of existing surface to received concrete topping.

1.2 RELATED REQUIREMENTS

A. Materials Testing and Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.
B. Bituminous Dampproofing: Section 07 11 13, BITUMINOUS DAMPPROOFING.
C. Concrete Roads, Walks, and Similar Exterior Site Work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. American Concrete Institute (ACI):
   1. 117-15 - Tolerances for Concrete Construction, Materials and Commentary.
   2. 117M-10(R2015) - Tolerances for Concrete Construction, Materials and Commentary.
   3. 211.1-91(R2009) - Proportions for Normal, Heavyweight, and Mass Concrete.
   4. 211.2-98(R2004) - Selecting Proportions for Structural Lightweight Concrete.
   5. 301/310M-10 - Structural Concrete.
   6. 305.1-14 - Hot Weather Concreting.
   7. 306.1-90(R2002) - Cold Weather Concreting.
   8. 318/318M-14 - Building Code Requirements for Structural Concrete and SP-66-04-ACI Detailing Manual.
   9. 347-04 - Guide to Formwork for Concrete.
C. ASTM International(ASTM):

1. A615/A615M-15ae1 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
2. A996/A996M-15 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
3. A1064/A1064M-15 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
4. C33/C33M-13 - Concrete Aggregates.
5. C39/C39M-15a - Compressive Strength of Cylindrical Concrete Specimens.
6. C94/C94M-15a - Ready-Mixed Concrete.
7. C143/C143M-15 - Slump of Hydraulic Cement Concrete.
8. C150/C150M-15 - Portland Cement.
9. C171-07 - Sheet Material for Curing Concrete.
10. C192/C192M-15 - Making and Curing Concrete Test Specimens in the Laboratory.
11. C219-14a - Terminology Relating to Hydraulic Cement.
12. C260/C260M-10a - Air-Entraining Admixtures for Concrete.
13. C330/C330M-14 - Lightweight Aggregates for Structural Concrete.
14. C494/C494M-15 - Chemical Admixtures for Concrete.
15. C618-15 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
16. C881/C881M-14 - Epoxy-Resin-Base Bonding Systems for Concrete.
17. C989/C989M-14 - Slag Cement for Use in Concrete and Mortars.
18. D1751-04(2013el) - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
19. E1745-11 - Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

D. International Concrete Repair Institute:
   1. 310.2R-2013 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Large scale drawings of reinforcing steel.

C. Manufacturer's Literature and Data:

1. Concrete Mix Design.
2. Air-entraining admixture, chemical admixtures, and curing compounds.
3. Indicate manufacturer's recommendation for each application.

1.5 DELIVERY

A. Deliver each ready-mixed concrete batch with mix certification in duplicate according to ASTM C94/C94M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II.

B. Pozzolans:
   1. Fly Ash: ASTM C618, Class C or F including supplementary optional physical requirements.

C. Coarse Aggregate: ASTM C33/C33M.
   1. Size 467 for footings and walls over 300 mm (12 inches) thick.
   2. Size 7 for coarse aggregate for applied topping and metal pan stair fill.
   3. Size 67 for other applications.

D. Fine Aggregate: ASTM C33/C33M.

E. Lightweight Aggregate for Structural Concrete: ASTM C330/C330M, Table 1.

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

G. Air-Entraining Admixture: ASTM C260/C260M.

H. Chemical Admixtures: ASTM C494/C494M.

I. Vapor Barrier: ASTM E1745, Class A with a minimum puncture resistance of 2200 g (3000 lbs.); minimum 0.38 mm (15 mil) thick.

J. Reinforcing Steel: ASTM A615/A615M or ASTM A996/A996M, deformed. See Structural Drawings for grade.

K. Forms: Wood, plywood, metal, or other materials, approved by Contracting Officer, of grade or type suitable to obtain type of finish specified.

1. Plywood: Exterior grade, free of defects and patches on contact surface.
2. Lumber: Sound, grade-marked, S4S stress graded softwood.
3. Form coating: As recommended by Contractor.

L. Welded Wire Fabric: ASTM A1064/A1064M, plainGrade 65sized as indicated.

M. Expansion Joint Filler: ASTM D1751.

N. Sheet Materials for Curing Concrete: ASTM C171.

O. Abrasive Aggregates: Aluminum oxide grains or emery grits.

P. Liquid Densifier/Sealer: 100 percent active colorless aqueous siliconate solution.

Q. Grout, Non-Shrinking: Premixed ferrous or non-ferrous. Grout to show no settlement or vertical drying shrinkage at 3 days. Compressive strength for grout, at least 18 MPa (2500 psi) at 3 days and 35 MPa (5000 psi) at 28 days.

2.2 ACCESSORIES

A. Bonding Agent: ASTM C 1059/C 1059M, Type II.

B. Structural Adhesive: ASTM C881, 2-component material suitable for use on dry or damp surfaces. Provide material Type, Grade, and Class to suit Project requirements.

C. Water Stops: Rubber base with self-healing properties. Expanding clay based products not acceptable.

D. Weeps: Geotextile type as recommended by Contractor and approved by Contracting Officer.

2.3 CONCRETE MIXES

A. Design concrete mixes according to ASTM C94/C94M, Option C.

B. Compressive strength at 28 days: minimum 25 MPa (3,000 psi.

C. Submit mix design and results of compression tests to the Contracting Officer for his evaluation. Identify all materials, including admixtures, making-up the concrete.

D. Maximum Slump for Vibrated Concrete: 100 mm (4 inches) tested according to ASTM C143.

E. Cement and Water Factor (See Table I):

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE				
Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio
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)	*

Footnotes:
1. If trial mixes are used, achieve a compressive strength 8.3 MPa (1 200 psi) in excess of f'c. For concrete strengths greater than 35 MPa (5,000 psi), achieve a compressive strength 9.7 MPa (1,400 psi) in excess of f’c.
2. Lightweight Structural Concrete: Pump mixes may require higher cement values as specified in ACI 318/318M.
3. For Concrete Exposed to High Sulfate Content Soils: Maximum water cement ratio is 0.44.
* Laboratory Determined according to ACI 211.1 for normal weight concrete or ACI 211.2 for lightweight structural concrete.

F. Air-entrainment as specified, and conform with the following for air content table:

TABLE II - TOTAL AIR CONTENT FOR VARIOUS SIZES OF COARSE AGGREGATES	
Nominal Maximum Size of Coarse Aggregate	Total Air Content, percent
10 mm (3/8 inches)	6 Moderate exposure; 7.5 severe exposure
13 mm (1/2 inches)	5.5 Moderate exposure; 7 severe exposure

TABLE II - TOTAL AIR CONTENT FOR VARIOUS SIZES OF COARSE AGGREGATES	
Nominal Maximum Size of Coarse Aggregate	Total Air Content, percent
19 mm (3/4 inches)	5 Moderate exposure; 6 severe exposure
25 mm (1 inches)	4.5 Moderate exposure; 6 severe exposure
40 mm (1 1/2 inches)	4.5 Moderate exposure; 5.5 severe exposure

2.4 BATCHING AND MIXING

A. Store, batch, and mix materials according to ASTM C94/C94M.
   1. Ready-Mixed Concrete: Comply with ASTM C94/C94M, except use of non-agitating equipment for transporting concrete to Site is not acceptable.
   2. Mixing Structural Lightweight Concrete: Charge mixer with 2/3 of total mixing water and total aggregate for each batch. Mix ingredients minimum 30 seconds in stationary mixer or minimum 10 revolutions at mixing speed in truck mixer. Add remaining mixing water and other ingredients and continue mixing. Above procedure may be modified as recommended by aggregate producer.
   3. When aggregate producer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

PART 3 - EXECUTION

3.1 FORMWORK

A. Installation: Conform to ACI 347. Construct forms to obtain concrete of the shapes, dimensions and profiles indicated, with tight joints.
B. Design and construct forms to prevent bowing-out of forms between supports and to be removable without prying against or otherwise damaging fresh concrete.
C. When patching formed concrete, seal form edges against existing surface to prevent leakage; set forms so that patch is flush with adjacent surfaces.
D. Treating and Wetting: Treat or wet concrete contact surfaces:
   1. Coat plywood and lumber forms with non-staining form sealer.

2. Wet wood forms thoroughly when they are not treated with form release agent.
3. Prevent water from accumulating and remaining within forms.
4. Clean and coat removable metal forms with light form oil before reinforcement is placed.
5. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
6. Prevent water from accumulating and remaining within forms.

E. Inserts, Sleeves, and Similar Items: Install flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges, and other cast-in items specified in other Sections. Place where indicated, square, flush and secured to formwork.

F. Construction Tolerances - General: Install and maintain concrete formwork to assure completion of work within specified tolerances.

G. Adjust or replace completed work exceeding specified tolerances before placing concrete.

3.2 REINFORCEMENT

A. Install concrete reinforcement according to ACI 318 and ACI SP-66.

B. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

C. Drilling for Dowels in Existing Concrete: Use sharp bits, drill hole slightly oversize, fill with epoxy grout, inset the dowel, and remove excess epoxy.

3.3 VAPOR BARRIER

A. Except where membrane waterproofing is required, place interior concrete slabs on a continuous vapor barrier.

B. Lap joints 150 mm (6 inches) and seal with a compatible pressure-sensitive tape.

C. Patch punctures and tears.

3.4 PLACING CONCRETE

A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval from Contracting Officer's Representative before placing concrete.

B. Install screeds at required elevations for concrete slabs.

C. Roughen and clean free from laitance, foreign matter, and loose particles before placing new concrete on existing concrete.
   1. Blow-out areas with compressed air and immediately coat contact areas with adhesive in compliance with manufacturer's instructions.
D. Place structural concrete according to ACI 301 and ACI 318.
E. Convey concrete from mixer to final place of deposit by method that will prevent segregation or loss of ingredients. Do not deposit, in Work, concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work.
F. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Continuously vibrate during placement of concrete.
G. Concrete Fill in Stair Tread and Landing Pans: Coat steel with bonding agent and fill pans with concrete. Reinforce with 2 inch by 2 inch by 1.6 mm (0.06 inch) welded wire mesh at midpoint.
H. Hot Weather Concrete Placement: As recommended by ACI 305.1 to prevent adversely affecting properties and serviceability of hardened concrete.
I. Cold Weather Concrete Placement: As recommended by ACI 306.1, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly.
   1. Do not use calcium chloride without written approval from Contracting Officer's Representative.

3.5 TOLERANCES

A. Slab on Grade Finish Tolerance: Comply with ACI 117, FF-number and FL-number method.
   1. Paragraph 4.8.3, Class A 3 mm (1/8 inches) for offset in form-work.
   2. Table R4.8.4, "Flat" 6 mm (1/4 inch) in 3 m (10 feet) for slabs.

3.6 PROTECTION AND CURING

A. Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical damage, and excessive hot or cold temperatures.
B. Curing Methods: Cure concrete with curing compound using wet method with sheets.

C. Formed Concrete Curing: Wet the tops and exposed portions of formed concrete and keep moist until forms are removed.
   1. If forms are removed before 14 days after concrete is cast, install sheet curing materials as specified above.
D. Concrete Flatwork Curing:
   1. Install sheet materials according to the manufacturer's instructions.
      a. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.7 FORM REMOVAL

A. Maintain forms in place until concrete is self-supporting, with construction operation loads.
B. Remove fins, laitance and loose material from concrete surfaces when forms are removed. Repair honeycombs, rock pockets, sand runs, spalls, or otherwise damaged surfaces by patching with the same mix as concrete minus the coarse aggregates.
C. Finish to match adjacent surfaces.

3.8 FINISHES

A. Vertical and Overhead Surface Finishes:
   1. Surfaces Concealed in Completed Construction: As-cast; no additional finishing required.
   2. Surfaces Exposed to View Scheduled for Paint Finish: Remove fins, burrs and similar projections by mechanical means approved by Contracting Officer's Representative flush with adjacent surface. Lightly rub with fine abrasive stone or hone. Use ample amount of water during rubbing without working up a lather of mortar or changing texture of concrete.
   3. Surfaces Exposed to View in Finished Areas: Grout finish, unless otherwise shown, for uniform color and smooth finish treated.
      a. Remove laitance, fins and burrs.
      b. Scrub concrete with wire brushes. Clean stained concrete surfaces with hone or stone.
      c. Apply grout composed of 1 part Portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout

into surface of concrete with cork floats or fiber brushes until pits and honeycomb are filled.

d. After grout has hardened, but is still plastic, remove surplus grout with sponge rubber float and by rubbing with clean burlap.

e. In hot, dry weather fog spray surfaces with water to keep grout wet during setting period. Complete finished areas in same day. Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

B. Slab Finishes:

1. Allow bleed water to evaporate before surface is finished. Do not sprinkle dry cement on surface to absorb water.

2. Scratch Finish: Rake or wire broom after partial setting slab surfaces to received bonded applied cementitious application, within 2 hours after placing, to roughen surface and provide permanent bond between base slab and applied cementitious materials.

3. Float Finish: Interior and exterior ramps, interior stair treads, and platforms, both equipment pads, and slabs to receive non-cementitious materials, except as specified.

a. Screen and float to smooth dense finish.

b. After first floating, while surface is still soft, check surfaces for alignment using straightedge or template. Correct high spots by cutting down with trowel or similar tool. Correct low spots by filling in with material same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat slab to uniform sandy texture.

4. Steel Trowel Finish: Applied toppings, concrete surfaces to receive resilient floor covering or carpet, future floor roof and other monolithic concrete floor slabs exposed to view without other finish indicated or specified.

a. Delay final steel troweling to secure smooth, dense surface, usually when surface can no longer be dented by fingers. During final troweling, tilt steel trowel at slight angle and exert heavy pressure on trowel to compact cement paste and form dense, smooth surface.

b. Finished surface: Free from trowel marks. Uniform in texture and appearance.

5. Broom Finish: Finish exterior slabs, ramps, and stair treads with bristle brush moistened with clear water after surfaces have been floated.
6. Finished Slab Flatness (FF) and Levelness (FL):
   a. Slab on Grade: Specified overall value FF 25/FL 20. Minimum local value FF 17/FL 15.
   b. Test flatness and levelness according to ASTM E1155.

3.9 SURFACE TREATMENTS

A. Mix and apply the following surface treatments according to manufacturer's instructions.
   1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
B. Liquid Densifier/Sealer: Use for exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish .
C. Slip Resistant Finish:
   1. Except where safety nosing and tread coverings are shown, apply abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms.
      a. Broadcast aggregate uniformly over concrete surface. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water sufficiently to slightly expose abrasive aggregate.

3.10 APPLIED TOPPING

A. Install concrete topping with thickness and strength shown with only enough water to ensure stiff, workable, plastic mix.
B. Continuously place applied topping until entire area is complete, struck off with straightedge, compact by rolling or tamping, float and steel trowel to hard smooth finish.

3.11 RESURFACING FLOORS

A. Remove existing flooring by abrasive blasting or grinding, in areas to receive resurfacing, to expose existing structural slab. Achieve a surface profile of 2 to 4 according to ICRI 310.2R for the condition found at Site.

B. Prepare exposed structural slab surface by cleaning, wetting, and applying adhesive according to manufacturer's instructions as specified in the flooring section.

3.12 FOUNDATION WALL INFILL

A. Install air-entrained concrete at foundation wall infill, as indicated.

B. Install expansion and contraction joints, waterstops, weep holes, reinforcement and railing sleeves, as indicated.

C. Finish exposed surfaces to match adjacent concrete surfaces, new or existing.

D. Place porous backfill, as indicated on Drawings.

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SECTION 03 35 36

FLOOR SEALER FOR CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Floor sealer for cast-in-place concrete floor slabs where left exposed as finished floor.

1.02 REFERENCE STANDARDS

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

B. International Concrete Repair Institute (ICRI):
   1. ICRI PCI-10 - Concrete Surface Profile Chips.

1.03 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, for submittal procedures.

B. Product Data: Manufacturer's literature with features/options marked up to suit this Project.

C. Manufacturers' Instructions: Installation instructions.

1.04 QUALITY ASSURANCE

A. Environmental Requirements: Manufacturer and Contractor shall conform to federal, state, and local VOC (Volatile Organic Compound) regulations in area where Project is located. Notify Architect in writing if variations to Specifications herein are required.
   1. VOC content shall be a maximum 350 grams per liter, unless codes or laws that are more stringent apply.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Floor Sealer: ASTM C1315, Type I, Class A. Two coats of water-based acrylic clear sealer, non-yellowing, resistant to blush, and satin finish as recommended by manufacturer for preventing staining by waterborne and oil substances.
   1. Acceptable Manufacturers and Products:
      a. ChemMasters; Polyseal WB: www.chemmasters.net.
      b. Dayton Superior; Ultra Seal EF: www.daytonsuperior.com.
      c. Euclid Chemical Co.; Everclear VOX: www.euclidchemical.com.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive concrete sealer.

B. Notify Architect if surfaces are not acceptable.

C. Do not begin application until unacceptable conditions have been corrected.

3.02 PREPARATION

A. Clean surfaces to receive coatings. Remove loose and foreign matter that could interfere with application or performance of sealer.
   1. Do not apply over curing compounds. Abrasively remove without damaging concrete surfaces by method recommended by curing compound manufacturer.
      a. Contractor shall “brush blast (shot)” the surface. Use a self-contained shot-blasting machine, such as a Blastrac, that utilizes Grade S-170 or S-230 steel shot to open the pores of

the concrete and clean the floor – but leave a very light profile similar to Concrete Surface Profile Number (CSP) 1 ("acid-etched") per ICRI PCI-10.

3.03 INSTALLATION

A. Floor Sealer:
   1. Comply with manufacturer's Product Data, including product technical bulletins, product catalog installation instructions, and product carton instructions.
   2. Apply at a uniform coverage with an individual handheld pump-up or airless sprayer or by roller.
      a. The use of common garden-type sprayers will not be acceptable.
      b. If applying by roller, use a short 3/8-inch nap, solvent-resistant roller cover.
   3. The first coat shall act as a primer for the second coat. Allow the first coat to dry tack-free before applying the second coat.
      a. Follow the manufacturer's prescribed coverage rates.

3.04 PROTECTION

A. Protect concrete that will remain exposed during the construction period both – before *and* after it has received a floor sealer.

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SECTION 04 01 00
MAINTENANCE OF MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Repointing existing masonry joints.
   2. Cleaning masonry, including removal of algae and dirt.

1.2 RELATED REQUIREMENTS

A. Mortars for new masonry: Section 04 05 13, MASONRY MORTARING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. ASTM International (ASTM):
   1. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
   2. C144-11 - Aggregate for Masonry Mortar.
   3. C150/C150M-15 - Portland Cement.
   4. C207-06(2011) - Hydrated Lime for Masonry Purposes.
   5. C216-15 - Facing Brick (Solid Masonry Units Made from Clay or Shale).
   6. C270-14a - Mortar for Unit Masonry.
   7. C295/C295M-12 - Petrographic Examination of Aggregates for Concrete.

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. Samples:
   1. Pointing Mortar: Molded, 150 mm (6 inches) long for each type, texture, and color.
D. Test reports:
   1. Preconstruction test results of existing masonry mortar and units.
   2. Recommended mortar mix and mortar materials sources.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Documented experience in completion of work, similar in design, material, and extent specified.

B. Preconstruction Testing:

1. Existing Mortar: according to ASTM C295/C295M.
   a. Recommend mortar mix compatible with existing and mortar material sources required to match existing color and texture.

C. Mockups: Prepare mockup in size indicated on Drawings, demonstrating quality and aesthetics of tuck pointing and cleaning.

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 materials covered, protected from weather, and elevated above grade.

1. Prevent contamination of aggregates.

B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Environment:

1. Cold Weather Requirements: Maintain mortar ingredients and substrate within temperature range between 4 degrees C (40 degrees F) and 49 degrees C (120 degrees F) when outside temperature is less than 4 degrees C (40 degrees F).
2. Hot Weather Requirements: Protect mortar-joint from evaporation of moisture from mortar material. When required, provide adequately shaded work area.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Mortar Components:
   1. Hydrated Lime: ASTM C207, Type S.
   2. Aggregate: ASTM C144.
   3. Portland Cement: ASTM C150/C150M, Type I.
   4. Water: Potable, free of substances that are detrimental to grout, masonry, and metal.

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 REPLACEMENT MASONRY UNITS (NOT USED)

2.4 MIXES

A. Tuck Pointing Mortar: ASTM C270; Appendix X3.
   1. Type K.
   2. Type K: 1 part Portland cement, 4 parts hydrated lime and 11-1/4 to 15 parts fine sand.

2.5 ACCESSORIES

A. Cleaning Agent: Soapless, non-acidic, detergent, specially prepared for cleaning brick, and stone, and concrete masonry.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
B. Protect existing construction and completed work from damage.
   1. Protect from mortar droppings and cleaning operations.
C. Remove existing fixtures and fittings concealing masonry joints to permit repointing and repair.

3.2 EXISTING MORTAR JOINTS

A. Cut out existing bed and head mortar joints, to uniform depth of 19 mm (3/4 inches), or to sound mortar without damaging edges and faces of existing masonry units to remain.
B. Remove dust and debris from joints.

1. Do not rinse when temperature is below freezing.

3.3 TUCK POINTING

A. Dampen joints immediately before tuck pointing. Allow masonry units to absorb surface water.

B. Tightly pack tuck pointing mortar into joints in thin layers, 6 mm (1/4 inch) thick, maximum.

C. Allow layer to become slightly hardened before applying next layer.

D. Pack final layer flush with surfaces of masonry units.

3.4 MASONRY UNIT REPLACEMENT (NOT USED)

3.5 JOINT TOOLING

A. Tool repointed joints when mortar becomes slightly hardened.

B. Produce smooth, compacted, concave joint matching existing.

3.6 CLEANING

A. Remove mortar splatter from exposed surfaces immediately.

B. Clean exposed masonry surfaces on completion.

C. Remove mortar droppings and other foreign substances from wall surfaces.

D. Wet surfaces with clean water.

E. Wash with cleaning agent.

F. Brush masonry surfaces with stiff fiber brushes while washing.

G. Immediately after washing, rinse with clean water.

1. Remove traces of detergent, foreign streaks, or stains.

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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 masonry sections.

1.2 RELATED REQUIREMENTS

A. Mortar used in Section:
   1. Section 04 20 00, UNIT MASONRY.
B. Mortar Color: Section 09 06 00, SCHEDULE FOR FINISHES (“Match color of existing mortar on adjoining exterior walls”).

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.
D. Certificates: Certify each product complies with specifications.
   1. Portland cement.

2. Masonry cement.
3. Mortar cement.
4. Hydrated lime.
5. Fine aggregate.

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/C270M.
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/C207M, Type S.

B. Aggregate for Masonry Mortar: ASTM C144/C144M and as follows:

1. Light colored sand for mortar for laying face brick.
2. White plastering sand meeting sieve analysis for mortar joints for pointing except that 100 percent passes No. 8 sieve, with a maximum of 5 percent being retained on No. 16 sieve.
3. 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/C270M.
   1. Admixtures:
      a. Do not use mortar admixtures, and color admixtures unless approved by Contracting Officer's Representative (COR).
      b. Do not use antifreeze compounds.
C. Colored Mortar:
   1. Maintain uniform mortar color for exposed work, throughout.
   2. Alteration Work Mortar Color: Match existing mortar.

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 parging below grade.
B. Type S Mortar: Use for masonry below grade and setting cast stone.
C. Brick Veneer Over Frame Back Up Walls: Use Type S Portland cement-lime mortar.
D. Type N Mortar: Use for other masonry work.

E. Type N Mortar: Use for pointing items specified.

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/C780M.

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SECTION 04 05 16
MASONRY GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Grout for filling hollow concrete masonry cores.

1.2 RELATED REQUIREMENTS

A. Grout used in Section:
   1. Section 04 20 00, UNIT MASONRY.
B. Ready-Mixed Grout: Section 09 30 13, CERAMIC/PORCELAIN TILING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. American National Standards Institute (ANSI):
   1. A118.6-10 - Standard Cement Grouts for Tile Installation.
C. ASTM International (ASTM):
   1. C40/C40M-11 - Organic Impurities in Fine Aggregates for Concrete.
   2. C150/C150M-15 - Portland Cement.
   3. C207-06(2011) - Hydrated Lime for Masonry Purposes.
   4. C404-11 - Aggregates for Masonry Grout.
   5. C476-11 - Grout for Masonry.
   6. C595/C595M-15e1 - Blended Hydraulic Cement.
   7. C979/C979M-10 - Pigments for Integrally Colored Concrete.
   8. C1019-14 - Sampling and Testing Grout.

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. Grout, each type.
   2. Cement.
   3. Aggregate.
D. Certificates: Certify each product complies with specifications.
   1. Blended hydraulic cement.

2. Portland cement.
3. Grout.
4. Hydrated lime.
5. Aggregate.

1.5 QUALITY ASSURANCE

A. Preconstruction Testing:
1. Engage independent testing laboratory to perform tests and submit reports.
a. Deliver samples to laboratory in number and quantity required for testing.
2. Grout:
a. Test compressive strength according to ASTM C1019 standard.
3. Aggregate:
a. 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, production run number, and manufacture date.

1.7 STORAGE AND HANDLING

A. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water, and wind.
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. Grout Components:
1. Hydrated Lime: ASTM C207, Type S.
2. Aggregate For Masonry Grout: ASTM C404, Size 8.
3. Blended Hydraulic Cement: ASTM C595, Type IS, IP.

4. Portland Cement: ASTM C150, Type I.
5. Water: Potable, free of substances that are detrimental to grout, masonry, and metal.

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer.

2.3 MIXES

A. Grout: ASTM C476; fine grout and coarse grout.
B. Ready-Mixed Grout: ANSI A118.8.

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 mortar from masonry cells protruding more than 13 mm (1/2 inch) to permit grout flow.
D. Remove debris from grout spaces.
E. Verify reinforcement is correctly placed before placing grout.

3.2 MIXING

A. Mix grout in mechanically operated mixer.
   1. Mix grout for five minutes, minimum.
B. Measure ingredients by volume using container of known capacity.
C. Mix water with grout dry ingredients.
   1. Slump Range: 200 to 275 mm (8 to 11 inches).

3.3 GROUTING

A. Install grout according to Section 04 20 00, UNIT MASONRY.
B. Use fine grout for filling wall cavities and hollow concrete masonry units where smallest cell dimension is 50 mm (2 inches) or less.
C. Use either fine grout or coarse grout for filling wall cavities and hollow concrete masonry units where smallest cell dimension is greater than 50 mm (2 inches).
D. Use grout for filling bond beam or lintel units.

- - E N D - -

SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior walls.

1.2 RELATED REQUIREMENTS

A. Sealants and Sealant Installation: Section 07 92 00, JOINT SEALANTS.
B. Color and Texture of Masonry Units: Section 09 06 00, SCHEDULE FOR FINISHES (“Match blend of existing masonry units on adjoining exterior walls”).

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. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
   2. C216-15 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
   3. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
   4. D1056-14 - Flexible Cellular Materials - Sponge or Expanded Rubber.
   5. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.
D. Brick Industry Association (BIA):
   1. TN 11B-88 - Guide Specifications for Brick Masonry, Part 3.
E. 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. Special masonry shapes, profiles, and placement.
   2. Masonry units for typical window and door openings, and, for special conditions as affected by structural conditions.
C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.

D. Samples:
   1. Face brick: Sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
   2. Anchors and Ties: Each type.
E. Certificates: Certify products comply with specifications.
   1. Face brick.

1.5 QUALITY ASSURANCE

A. Mock-Ups:
   1. Before starting masonry, build a Mock-Up minimum 1800 mm by 1800 mm (6 feet by 6 feet) with 600 mm (24 inch) 90-degree return for outside corner.
      a. Use masonry units from random cubes of units delivered to Project site.
      b. Include structural backup, reinforcing, ties, and anchors.
   2. Mock-Up approved by Contracting Officer's Representative (COR) sets workmanship and aesthetic quality for masonry work.
   3. Clean sample panel to test cleaning methods.
   4. Remove Mock-Up when directed by Contracting Officer's Representative (COR).

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 SYSTEM PERFORMANCE (NOT USED)

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer and from one production run.

2.3 UNIT MASONRY PRODUCTS

A. Brick:

1. Face Brick:

a. ASTM C216, Grade SW, Type FBS.

b. Brick when tested according to ASTM C67: Classified slightly efflorescent or better.

c. Sizes: Match existing.

2.4 ANCHORS, TIES, AND REINFORCEMENT

A. 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 shall be 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.

B. 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).

C. Adjustable Steel Column Anchor:
1. Two-piece anchor consisting of a 6 mm (1/4 inch) diameter steel rod to be welded to steel with offset ends, rod to permit 100 mm (4 inch) vertical adjustment of wire anchor.
2. Triangular shaped wire anchor 100 mm (4 inches) wide formed from 5 (3/16 inch) diameter galvanized wire, to extend minimum 75 mm (3 inches) into joints of masonry.

D. Adjustable Steel Beam Anchor:
1. Z- or C-shaped 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).

2.5 ACCESSORIES

A. Weeps: Non-woven polymer mesh material sized to replace mortar in selected head joints.

B. Cavity Drainage Material: Open mesh polyester sheets or strips in configuration designed to prevent mortar droppings from clogging the cavity.
1. Thickness: Sized to suit clear width of cavity.
2. Height: 10-inch high.

C. 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, Class 5, 1800 degrees F.

D. Box Board:
   1. Mineral Fiber Board: ASTM C612, Class 1.
   2. 25 mm (1 inch) thickness.
   3. Other spacing material having similar characteristics is acceptable subject to Contracting Officer's Representative's (COR’s) approval.
E. Masonry Cleaner:
   1. Detergent-type cleaner selected for each type masonry.
   2. Acid cleaners are not acceptable.
   3. Use soapless type specially prepared for cleaning brick masonry.
F. 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.

PART 3 - EXECUTION

3.1 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 (COR) 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. Tooling Joints:
   1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
   2. Tool while mortar is soft enough to be compressed into joints and not raked out.
   3. Finish joints in exterior face masonry work with jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.

4. Tool Exposed interior joints in finish work concave unless specified otherwise.

E. Lintels:
1. Use steel lintels, for brick masonry openings unless shown otherwise.
2. Lintel Bearing Length: Minimum 100 mm (4 inches) at both ends.
3. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.

F. Wall, Furring, and Partition Units:
1. Lay out field units to provide Flemish bond.
2. At sides of openings, balance head joints in each course on vertical center lines of openings.
3. Minimum Masonry Unit Length: 100 mm (4 inches).

G. Before connecting new masonry with previously laid masonry, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

H. Wetting and Wetting Test:
1. Test and wet brick and clay tile according to BIA TN 11B.

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. Veneer to Concrete Walls:
1. Install dovetail slots in concrete vertically at 400 mm (16 inches) on centers.
2. Locate dovetail anchors at 400 mm (16 inch) maximum vertical intervals.
3.

C. 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 (NOT USED)

3.4 INSTALLATION - BRICK CONTROL JOINTS

A. Provide brick control joints (CJ) where indicated on Drawings.

B. Keep joint free of mortar and other debris.

C. Joints Occur In Masonry Walls:

1. Install preformed compressible joint filler in brick wythe.

D. Fill opening in exposed face of control joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.5 INSTALLATION - SEISMIC JOINTS

A. Keep seismic joints open and free of mortar. Remove mortar and other debris.

B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.

C. Fill opening in exposed face of seismic joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.6 INSTALLATION - ISOLATION JOINT (NOT USED)

3.7 INSTALLATION - BRICKWORK

A. Lay clay brick according to BIA TN 11B.

B. Laying:

1. Lay brick with bonded corners, unless indicated otherwise. Match Flemish bond of existing building.
2. Maintain bond pattern throughout.
3. Do not use brick smaller than half-brick at any angle, corner, break, or 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. Mortar Joints:

1. Exterior 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 vertical joints of exterior masonry veneer over foundations, bond beams, and other water stops in wall.
2. Install cavity drainage material in cavity.

E. Cavity-Type Exterior Walls:

1. 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.

3.8 INSTALLATION - CONCRETE MASONRY UNITS (NOT USED)

3.9 INSTALLATION - GLAZED STRUCTURAL FACING TILE (NOT USED)

3.10 POINTING

A. Fill joints with pointing mortar using rubber float trowel to apply mortar solidly into raked joints.

B. Tool exposed joints to smooth concave joint.

C. At joints with existing work, match existing joint.

3.11 GROUTING (NOT USED)

3.12 PLACING REINFORCEMENT (NOT USED)

3.13 INSTALLATION OF REINFORCED BRICK MASONRY (NOT USED)

3.14 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY (NOT USED)

3.15 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).

3.16 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.

3.17 FIELD QUALITY CONTROL (NOT USED)

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SECTION 04 43 01
STONE MASONRY VENEER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rubble stone veneer at exterior walls.

1.02 RELATED REQUIREMENTS

A. Section 04 05 13 – Masonry Mortaring: Setting and pointing mortars.

B. Section 04 20 00 - Unit Masonry:
   1. Requirements for Mock-Up of exterior wall.
   2. Joint reinforcement, Ties, and Anchors.

C. Section 07 60 00 – Flashing and Sheet Metal: Flashings.

D. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

D. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this Section.

1.05 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, for submittal procedures.

B. Product Data: Provide data on stone units, mortar, and reinforcement.

C. Samples: Submit a minimum of four stone samples illustrating minimum and maximum stone sizes, color ranges, and texture.

D. Samples: Submit mortar color samples.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type required by this Section, with minimum five years of documented experience.

1.07 MOCK-UP - SEE SECTION 04 20 00 - UNIT MASONRY FOR MOCK-UP OF EXTERIOR WALL

A. Locate where directed.

B. Mock-Up may not remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect stone from discoloration during storage on-site.

B. Provide ventilation to prevent condensation from forming on stone.

1.09 FIELD CONDITIONS

A. Cold Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.01 STONE

A. Surface Texture (for Exterior Watertable): Rock face (match existing).

2.02 MORTAR - SEE SECTION 04 20 00 – UNIT MASONRY.

A. Setting Mortar: ASTM C270, Type S, using the Proportion Method.

B. Pointing Mortar: Type N, and using the Property Method in ASTM C270.
   1. Color: Mineral oxide pigment; match existing colors.

2.03 ACCESSORIES - SEE SECTION 04 20 00 - UNIT MASONRY.

A. Wall Ties: Formed steel wire, at least 3/16 inch (5 mm) diameter, hot dip galvanized per ASTM A123/A123M, eye and pintle type, with provision for vertical adjustment after attachment.

B. Other Anchors in Direct Contact with Stone: ASTM A36/A36M steel, galvanized after fabrication to ASTM A123/A123M, of sizes and configurations required for support of stone and applicable superimposed loads.

C. Setting Buttons and Shims: Lead.

D. Flashings: Stainless-steel type as specified in Section 07 60 00 – Flashing and Sheet Metal.

E. Weep/Cavity Vents: Corrugated plastic sheet.
   1. Material: 0.024-inch (0.6 mm) thick translucent impact-resistant polystyrene sheet formed into a corrugated profile and packaged in 25-foot rolls. Design for positioning on thru-wall flashing prior to applying mortar to bed joint. Die-cut rolls to provide four or five 3/16-inch-square weep holes approximately 9 inches on center.

F. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.04 STONE FABRICATION

A. Thickness at Mortar Joints: 3-5/8 inch (92 mm).

B. Pattern and Coursing:
   1. Exterior Watertable: Coursed and roughly squared to match existing.

COURSED AND ROUGHLY SQUARED

C. Fabricate for 3/8 inch (10 mm) beds and joints.

D. Bed and Joint Surfaces for Exterior Watertable:
   1. Match existing.

E. Backs: Rough or split.

F. Form stone corners to irregular joint profile. Clean jagged corners from stone in preparation for setting.

G. Slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.

H. Cut drip slot in bottom surface of work projecting more than 1/2 inch (13 mm) over openings in wall. Size slot not less than 3/8 inch (10 mm) wide and 1/4 inch (6 mm) deep for full width of projection.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that support work and site conditions are ready to receive work of this Section.

B. Verify that items built-in under other sections of this Project Manual are properly located and sized.

3.02 PREPARATION

A. Establish lines, levels, and coursing. Protect from disturbance.

B. Clean stone prior to erection. Do not use wire brushes or implements that mark or damage exposed surfaces.

C. Clean sawn surfaces of rust stains and iron particles.

3.03 INSTALLATION

A. Install flashings of longest practical length and seal watertight to back-up. Lap end joints minimum 6 inches (150 mm) and seal watertight.

B. Size stone units to fit opening dimensions and perimeter conditions.

C. Wet absorptive stone in preparation for placement to minimize moisture suction from mortar.

D. Arrange stone pattern to provide color uniformity and minimize visual variations, and provide a uniform blend of stone unit sizes.

E. Provide setting and pointing mortars in accordance with Section 04 05 13 – Masonry Mortaring.
   1. If water is lost by evaporation, re-temper mortar only within two hours after mixing.
   2. At ambient air temperature 80 degrees F (26 degrees C) and above, use mortar within two hours after mixing; at ambient air temperature below 50 degrees F (10 degrees C), use mortar within two-and-one-half hours after mixing.

F. Fill dowel holes in stone units with mortar.

G. Arrange stone coursing in specified bond with consistent joint width.

H. Set stone in full mortar setting bed to fully support stone over bearing surface. Use setting buttons or shims to maintain correct joint width.

I. Install weep/cavity vents in vertical stone joints at 9 inches (230 mm) on center horizontally; immediately above horizontal flashings and at top of each cavity space; do not permit mortar accumulation in cavity space.

3.04 REINFORCEMENT AND ANCHORAGE (EXTERIOR WATERTABLE)

A. Attach wall ties to back-up and embed into stone veneer at a maximum of 16 inches on center vertically and at a maximum of 24 inches on center horizontally with not less than one anchor for every 2-2/3 sq ft (0.25 sq m) of veneer.

B. In addition, place wall ties at maximum 6 inches (150 mm) on center each way around perimeter of openings, within 12 inches (300 mm) of openings.

3.05 JOINTS (EXTERIOR WATERTABLE)

A. Leave the following joints open for sealant:
   1. Head joints in top courses, including sills.
   2. Joints in projecting units.
   3. Joints below ledge and relieving angles.
   4. Joints labeled "expansion joint".

B. Rake out mortar joints 5/8 to 3/4 inch (16 to 19 mm) and brush joints clean to accommodate pointing mortar. Fill joints with pointing mortar.

C. Pack mortar into joints and work into voids. Neatly tool surface to concave joint.

D. At joints to be sealed, clean mortar out of joint before it sets. Brush joints clean.

3.06 CLEANING

A. Remove excess mortar as work progresses, and upon completion of work.

B. Clean soiled surfaces with cleaning solution.

C. Use non-metallic tools in cleaning operations.

3.07 PROTECTION

A. During temporary storage on-site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

END OF SECTION

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. Roof Decks Framing: Section 03 51 16, GYPSUM CONCRETE ROOF DECKS.
C. Steel Joist: Section 05 21 00, STEEL JOIST FRAMING.
D. Steel Decking: Section 05 31 00, STEEL DECKING.
E. Fireproofing: Section 07 81 00, APPLIED FIREPROOFING.
F. Steel Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
G. Steel Support: Section 10 13 00, DIRECTORIES.
H. 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. A325-14 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. A490-14a - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
10. A500/A500M-13 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
11. A501/A501M-14 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
12. A572/A572M-15 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. A992/A992M-15 - Structural Shapes.
14. F2329/F2329M-15 - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy steel Bolts, Screws, washers, Nuts, and Special Threaded Fasteners.

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 A325 or A490 Bolts.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Show size, configuration, and fabrication and installation details.
C. Test Reports: Certify products comply with specifications.
   1. Welders' qualifying tests.
D. Certificates: Certify each product complies with specifications.
   1. Structural steel.
   2. Steel connections.
   3. Welding materials.
   4. Shop coat primer paint.
E. Qualifications: Substantiate qualifications comply with specifications.
   1. Fabricator with project experience list.
   2. Installer with project experience list.
   3. Welders and welding procedures.
F. Delegated Design Drawings and Calculations: Signed and sealed by responsible Architect/Engineer.
   1. Connection calculations.

G. Record Surveys: Signed and sealed by responsible surveyor or engineer.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: AISC Quality Certification participant designated as AISC Certified Plant, Category STD.
   1. Regularly fabricates specified products.
   2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.
B. Installer Qualifications: AISC Quality Certification Program participant designated as AISC-Certified Erector, Category ACSE.
   1. Regularly installs specified products.
   2. Installed specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.
C. Before commencement of Work, ensure steel erector provides written notification required by OSHA 29 CFR 1926.752(e). Submit a copy of the notification to Contracting Officer's Representative.

D. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where project is located.

B. Design structural steel framing connections complying with specified performance:

1. Load Capacity: Resist loads indicated on drawings. Account for connection and member loads and eccentricities.
   a. Request additional design criteria when necessary to complete connection design.
2. Configuration: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings 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.
3. Not Used.
4. Configuration: Design framing member sizes, dimensions, and locations to suit cooling tower load, size, and configuration. Submit detailed drawings and design calculations, prepared by a

registered Professional Engineer, for approval before members are fabricated.

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 A501/A501M.
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 A325 .
   2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
   3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ASME B18.22.1.
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 31 00
STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Single pan fluted metal roof deck as roof substrate.

1.2 RELATED REQUIREMENTS

A. Structural Steel Shapes: Section 05 21 00, STRUCTURAL STEEL FRAMING.

B. Color: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Finish Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. AISI - American Iron and Steel Institute.

1. S100-12 - Specification for the Design of Cold-formed Steel Structural Members.

C. American Welding Society (AWS):

1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
2. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.

D. ASTM International (ASTM):

1. A36/A36M-14 - Carbon Structural Steel.
2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. 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.
4. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. E119-15 - Fire Tests of Building Construction and Materials.

E. FM Global (FM):

1. 1-28-15 - Wind Design.
2. Factory Mutual Research Approval Guide.

F. Master Painters Institute (MPI):

1. No. 18 - Primer, Zinc Rich, Organic.

G. Military Specifications (Mil. Spec.):

1. MIL-P-21035B - Paint, High Zinc Dust Content, Galvanizing Repair.

H. Steel Deck Institute (SDI):

1. No. 31-07 - Design Manual for Composite Deck, Form Decks, and Roof Decks.

I. UL LLC (UL):

1. Listed - Online Certifications Directory.
2. 580-13 - Tests for Uplift Resistance of Roof Assemblies.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show layout, connections to supporting members, anchorage, sump pans, accessories, deck openings and reinforcements.
2. Show similar information necessary for completing installation as shown and specified, including supplementary framing, ridge and valley plates, cant strips, cut openings, special jointing or other accessories.
3. Show welding, side lap, closure, deck reinforcing and closure reinforcing details.
4. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Show steel decking section properties and structural characteristics.

D. Certificates: Certify each product complies with specifications.

1. Show steel decking is UL Listed for specified application.

E. Qualifications: Substantiate qualifications comply with specifications.

1. Welders and welding procedures.

F. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

1.5 QUALITY ASSURANCE

A. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Global and are listed in “Factory Mutual Research Approval Guide” for “Class 1” fire rated construction.

B. Welders and Welding Procedures Qualifications: AWS D1.3/D1.3M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design steel decking and accessories according to AISI S100.
   1. Wind Uplift Resistance and Corner Conditions: UL 580, Class 90.

2.2 MATERIALS

A. Galvanized Steel Sheet: ASTM A653/A653M; G90 coating.
B. Steel Shapes: ASTM A36/A36M.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 METAL ROOF DECK

A. Metal Roof Deck: FM Global approved as metal roof deck panels.
   1. Steel decking of the type, depth, thickness, and section properties as shown.
B. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces as permanent support for superimposed loads.
   1. Deck Style:
      a. Wide Rib (Type B) deck.
      b. Intermediate Rib (Type F) deck.
      c. Narrow Rib (Type A) deck.
   2. Depth and Thickness: As indicated on drawings.
   3. Material: Galvanized sheet steel.

C. Do not use steel deck for hanging supports of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.

2.5 FABRICATION

A. Fabricate steel decking in sufficient lengths to extend over 3 or more supports, except for interstitial levels.
   1. Cut metal deck units to proper length in shop.
B. Fabricate accessories required to complete installation of steel decking.
   1. Exposed to View: Fabricate from sheet steel matching metal decking.

2. Concealed from View: Fabricate from galvanized sheet steel.

C. Sheet Metal Accessories:

1. Metal Cover Plates: For end-abutting decking, to close gaps at changes in deck direction, columns, walls and openings.
   a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges.
   a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
3. Metal Closure Strips: For openings between decking and other construction. Form to configurations required to provide tight-fitting closures at open ends of flutes and sides of decking.
   a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
4. Ridge and Valley Plates: Minimum 100 mm (4 inch) wide ridge and valley plates where roof slope exceeds 1/24 (1/2 inch per foot).
   a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
5. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the drawings. Fabricate cant strips with minimum 125 mm (5 inch) face width.
   a. Sheet Steel: Minimum 0.8 mm (0.03 inch) thick.
6. Seat Angles for Deck: Provide where beam does not frame into column.
7. Sump Pans for Roof Drains: Fabricated from single piece galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain. Provide sump pans of adequate size to receive roof drains and with bearing flanges minimum 75 mm (3 inches) wide. Recess pans minimum 38 mm (1-1/2 inches) below roof deck surface, unless otherwise shown or required by deck configuration. Drain holes will be field cut.
   a. Sheet Steel: Minimum 1.7 mm (0.06 inch) thick.

2.6 FINISHES

A. Shop prime painted sheet steel with two coats of primer.

2.7 ACCESSORIES

A. Primer: Manufacturer's standard primer compatible with finish painting specified in Section 09 91 00, PAINTING.

B. Welding Materials: AWS D1.1, type to suit application.

C. Galvanizing Repair Paint: MPI No. 18.

D. Touch-Up Paint: Match shop finish.

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 contaminates from structural steel surfaces where steel decking will be welded.

D. Verify structural steel framing installation is completed, plumbed, and aligned with temporary bracing installed where required.

E. Coordinate with structural steel erector to prevent overloading of structural members when placing steel decking for installation.

3.2 ERECTION

A. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace deck units that become damaged after erection and before casting concrete at no cost additional to the Government.

B. Place steel decking at right angles to supporting members with ends located over supports.

C. Lap end joints 50 mm (2 inches), minimum.

D. Roof Deck Fastening:

1. Fasten decking to steel supporting members by welding.
   a. Welds: 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength.
   b. Weld Spacing: Maximum 300 mm (12 inches) on center at every support. Use closer spacing where required for lateral force resistance by diaphragm action.
2. Fasten split or partial decking panels to structure in every valley.
3. Fasten decking to each supporting member at ribs where side laps occur.
   a. Power driven fasteners is acceptable in lieu of welding if strength equivalent to welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
4. Mechanically fasten decking side laps with self-tapping No. 8 or larger machine screws.
   a. Fastener Locations: Mid-span and maximum 900 mm (3 feet) on center.

5. Provide additional fastening necessary to comply with FM Approval for specified performance.

E. Cutting and Fitting:

1. Field cut steel decking to accommodate columns and other penetrating items.
2. Cut openings located and dimensioned on Structural Drawings.
3. Coordinate openings for other penetrations shown on approved submittal drawings but not shown on Structural Drawings.
   a. Cut and reinforce required opening.
4. Make cuts neat and trim using metal saw, drill or punch-out device. Cutting with torches is prohibited.
5. Do not make cuts in the metal deck that are not shown on the approved metal decking submittal drawings.
   a. When additional openings are required, submit scaled drawing, locating required opening and other openings and supports in immediate area.
   b. Do not cut the opening until drawing is approved by Contracting Officer's Representative.
   c. Provide additional reinforcing and framing required for opening.
   d. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected steel decking.
6. Opening Reinforcement: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.

F. Touch up damaged factory finishes.

1. Apply galvanizing repair paint to damaged galvanized surfaces.
2. Apply touch up paint to damaged shop painted surfaces.

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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.

B. Open web steel joists: Section 05 21 00, STEEL JOIST 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.

C. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated.

2. Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-load-Bearing Curtain wall: Lateral deflection of 1/600 of the wall height.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).

4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

5. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

6. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.

D. For cold-formed metal framing indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.

1.5 APPLICABLE PUBLICATIONS:

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

B. American Iron and Steel Institute (AISI):

Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

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

A36/A36M-08.....Standard Specifications for Carbon Structural Steel

A123/A123M-09.....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09.....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-10.....Standard Specifications for Carbon Steel Bolts and Studs

A653/A653M-10.....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

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 forstuds 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 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):

   0.84 mm (0.0329 inch)

   1.09 mm (0.0428 inch)

   1.37 mm (0.0538 inch)

   1.72 mm (0.0677 inch)2.45 mm (0.0966 inch)

2. Flange Width:

   35 mm (1-3/8 inches)

   (1-5/8 inches)

   (2 inches)

   (2-1/2 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.

2.3 FRAMING ACCESSORIES:

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

B. Provide accessories of manufacturer’s standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.

2. Bracing, bridging, and solid blocking.

3. Web stiffeners.

4. Gusset plates.

5. Deflection track and vertical slide clips.

6. Stud kickers and girts.

7. Reinforcement plates.

2.4 ANCHORS, CLIPS, AND FASTENERS:

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

B. 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.

2.5 REQUIREMENTS:

A. Welding in accordance with AWS D1.3

B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

A. Framing components may be preassembled into panels. Panels shall be square with components attached.

B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

C. Hold members in place until fastened.

D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer’s instructions with screw penetrating joined members by not less than 3 exposed screw threads.

E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

A. Handle and lift prefabricated panels in a manner as to not distort any member.

B. Securely anchor tracks to supports as shown.

C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.

D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.

G. Install headers in all openings that are larger than the stud spacing in that wall.

H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.

I. Studs in one piece for their entire length, splices will not be permitted.

J. Provide 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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ASECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall- and Ceiling-Mounted Items
2. Loose Lintels
3. Shelf Angles
4. Ladders
5. Railings

1.2 RELATED WORK

A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.

B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Prime and finish painting: Section 09 91 00, PAINTING.

D. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the Project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

C. Manufacturer's Certificates:

1. Anodized finish as specified.
2. Live load designs as specified.

D. Design Calculations for specified live loads including dead loads.

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

1.4 QUALITY ASSURANCE

A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each product type shall be the same and be made by the same manufacturer.

C. Assemble product to the greatest extent possible before delivery to the Project site.

D. Include additional features, which are not specifically prohibited by this Specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97.....Wood Screws

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

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

A36/A36M-12.....Structural Steel

A53/A53M-12.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123/A123M-12.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A307-12.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A525.....General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

C1107-13.....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

F436-11.....Hardened Steel Washers

F468-06(R2012).....Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws and Studs for General Use

D. American Welding Society (AWS):
D1.1-10.....Structural Welding Code Steel
D1.3-08.....Structural Welding Code Sheet Steel
E. National Association of Architectural Metal Manufacturers (NAAMM)
AMP 521-01.....Pipe Railing Manual
AMP 500-06.....Metal Finishes Manual
F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:
SP 1-04.....No. 1, Solvent Cleaning
SP 2-04.....No. 2, Hand Tool Cleaning
SP 3-04.....No. 3, Power Tool Cleaning
G. Federal Specifications (Fed. Spec):
RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.
B. Ladders and Rungs: 120 kg (250 pounds) at any point.
C. Railings and Handrails: 900 N (200 pounds) in any direction at any point.

2.2 MATERIALS

A. Structural Steel: ASTM A36.
B. Stainless Steel: ASTM A240/A240M, Type 302 or 304.
C. Steel Pipe: ASTM A53.
1. Galvanized for exterior locations. Provide the following instructions to the galvanizer:
a. Do not “quench” the galvanized finish.
b. Do not apply a post-galvanizing treatment that might interfere with paint adhesion.
2. Type S, Grade A unless specified otherwise.
3. NPS (inside diameter) as shown.
D. Primer Paint: As specified in Section 09 91 00, PAINTING.
E. Modular Channel Units:
1. Factory-fabricated, channel-shaped, cold-formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
2. Form channel within turned pyramid shaped clamping ridges on each side.

3. Provide case-hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
4. Factory-finish channels and parts with oven-baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.

F. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

A. Rough Hardware:
1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium-plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

B. Fasteners:
1. Bolts with Nuts:
   a. ASME B18.2.2.
   b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
   c. ASTM F468 for nonferrous bolts.
2. Screws: ASME B18.6.1.
3. Washers: ASTM F436, type to suit material and anchorage.

2.4 FABRICATION GENERAL

A. Material
1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or serviceability of the finished product.

B. Size:
1. Size and thickness of members as shown.

2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

D. Fasteners and Anchors

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power

actuated drive pins, welding, self-drilling and -tapping screws or bolts, unless indicated otherwise.

E. Workmanship:

1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.
   c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
   d. Provide holes, sinkages, and reinforcement shown and required for fasteners and anchorage items.
   e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
   f. Prepare members for the installation and fitting of hardware.
   g. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.
3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
   b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10

inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.

5. Cutting and Fitting:
   a. Accurately cut, machine and fit joints, corners, copes, and miters.
   b. Fit removable members to be easily removed.
   c. Design and construct field connections in the most practical place for appearance and ease of installation.
   d. Fit pieces together as required.
   e. Fabricate connections for ease of assembly and disassembly without use of special tools.
   f. Joints shall be firm when assembled.
   g. Conceal joining, fitting, and welding on exposed work as far as practical.
   h. Do not show rivets and screws prominently on the exposed face.
   i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:
   1. Finish exposed surfaces in accordance with NAAMM AMP 500 Metal Finishes Manual.
   2. Steel and Iron: NAAMM AMP 504.
      a. Zinc coated (Galvanized): ASTM A123/A123M, G90 unless noted otherwise. Provide the following instructions to the galvanizer:
         1) Do not “quench” the galvanized finish.
         2) Do not apply a post-galvanizing treatment that might interfere with paint adhesion.
      b. Surfaces exposed in the finished work:
         1) Finish smooth rough surfaces and remove projections.
         2) Fill holes, dents and similar voids and depressions with epoxy-type patching compound.
      c. Shop Prime Painting:
         1) Surfaces of Ferrous metal:
            a) Items not specified to have other coatings.
            b) Galvanized surfaces specified to have prime paint.

c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.

d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.

e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.

2) Non-Ferrous Metals: Comply with MAAMM-500 series.

G. Protection:

1. Spot-prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:

1. Fabricate ASTM A36/A36M structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Wall Mounted Items:

1. For items supported by metal-stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.
5. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

C. For Trapeze Bars:

1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.
2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
3. Fabricate concealed components of structural steel shapes unless shown otherwise.
4. Continuously weld connections where welds shown.

5. Use modular channel where shown with manufacturers bolts and fittings.
   a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
   b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

D. For Cubical Curtain Track:
   1. Fabricate assembly of steel angle as shown.
   2. Drill angle bent ends for anchor screws to acoustical suspension system and angle for hanger wires.
   3. Provide pipe sleeve welded to angle.

2.6 FRAMES (NOT USED)

2.7 GUARDS (NOT USED)

2.8 COVERS AND FRAMES FOR PITS AND TRENCHES (NOT USED)

2.9 GRATINGS (NOT USED)

2.10 LOOSE LINTELS

A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.

B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.

C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
   1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
   2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).

D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).

E. Provide bearing plates for lintels where shown.

F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.

G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.

H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

2.11 SHELF ANGLES

A. Fabricate from steel angles of size shown.

B. Fabricate angles with horizontal slotted holes for 19 mm (3/4 inch) bolts spaced at not over 900 mm (3 feet) on centers and within 300 mm (12 inches) of ends.

C. Provide adjustable malleable iron inserts for embedded in concrete framing.

2.12 PLATE DOOR SILL (NOT USED)

2.13 SAFETY NOSINGS (NOT USED)

2.14 LADDERS

A. Steel Ladders:

1. Fixed-rail type with steel rungs shouldered and headed into and welded to rails.
2. Fabricate angle brackets of 50 mm (2 inch) wide by 13 mm (1/2 inch) thick steel; brackets spaced maximum of 1200 mm (4 feet) apart and of length to hold ladder 175 mm (7 inches) from wall to center of rungs. Provide turned ends or clips for anchoring.
3. Provide holes for anchoring with expansion bolts through turned ends and brackets.
4. Where shown, fabricate side rails curved, twisted and formed into a gooseneck.
5. Galvanize exterior ladders after fabrication, ASTM A123/A123M, G-90. Provide the following instructions to the galvanizer:
   a. Do not “quench” the galvanized finish.
   b. Do not apply a post-galvanizing treatment that might interfere with paint adhesion.

2.15 RAILINGS

A. In addition to the dead load design railing assembly to support live load specified.

B. Fabrication General:

1. Provide continuous welded joints, dressed smooth and flush.
2. Standard flush fittings, designed to be welded, may be used.
3. Exposed threads will not be approved.
4. Form handrail brackets to size and design shown.
5. Exterior Post Anchors.
   a. Fabricate tube or pipe sleeves with closed ends or plates as shown.

C. Handrails:
   1. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
   2. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.

D. Steel Pipe Railings:
   1. Fabricate of steel pipe with welded joints.
   2. Number and space of rails as shown.
   3. Space posts for railings not over 1800 mm (6 feet) on centers between end posts.
   4. Form handrail brackets from malleable iron.
   5. Fabricate removable sections with posts at end of section.
   6. Removable Rails:
      a. Provide "U" shape brackets at each end to hold removable rail as shown. Use for top and bottom horizontal rail when rails are joined together with vertical members.
      b. Secure rail to brackets with 9 mm (3/8 inch) stainless steel through bolts and nuts at top rail only when rails joined with vertical members.
      c. Continuously weld brackets to post.
      d. Provide slotted bolt holes in rail bracket.
      e. Weld bolt heads flush with top of rail.

2.16 CATWALKS (NOT USED)

2.17 TRAP DOOR AND FRAMES WITH CEILING HATCH (NOT USED)

2.18 SIDEWALK DOOR (NOT USED)

2.19 SCREENED ACCESS DOORS AND FRAMES (NOT USED)

2.20 STEEL COUNTER OR BENCH TOP FRAME AND LEGS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.
   1. Provide temporary bracing for such items until concrete or masonry is set.
   2. Place in accordance with setting drawings and instructions.
   3. Build strap anchors, into masonry as work progresses.

C. Field weld in accordance with AWS.
   1. Design and finish as specified for shop welding.
   2. Use continuous weld unless specified otherwise.
D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power-actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
E. Spot-prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop-prime coat with same kind of paint used for shop-priming.
F. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

A. Anchorage to structure.
   1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
   2. Secure supports to concrete inserts by bolting or continuous welding as shown.
   3. Secure supports to mid height of concrete beams (when inserts do not exist) with expansion bolts and to slabs, with expansion bolts, unless shown otherwise.
   4. Secure steel plate or hat channels to studs as detailed.
B. Supports for Wall Mounted items:
   1. Locate center of support at anchorage point of supported item.
   2. Locate support at top and bottom of wall-hung cabinets.
   3. Locate support at top of floor cabinets and shelving installed against walls.
   4. Locate supports where required for items shown.
C. Supports for Cubicle Curtain Track:
   1. Install assembly where shown after ceiling suspension grid is installed.
   2. Drill angle for bolt and weld nut to angle prior to installation of tile.
D. Supports for Trapeze Bars:
   1. Secure plates to overhead construction with fasteners as shown.
   2. Secure angle brace assembly to overhead construction with fasteners as shown and bolt plate to braces.

3. Fit modular channel unit flush with finish ceiling, and secure to plate with modular channel unit manufacturer's standard fittings through steel shims or spreaders as shown.
   a. Install closure plates in channel between eye bolts.
   b. Install eyebolts in channel.

3.3 COVERS AND FRAMES FOR PITS AND TRENCHES (NOT USED)

3.4 FRAMES FOR LEAD LINED DOORS (NOT USED)

3.5 DOOR FRAMES (NOT USED)

3.6 OTHER FRAMES

A. Set frame flush with surface unless shown otherwise.
B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
C. Set in formwork before concrete is placed.

3.7 GUARDS (NOT USED)

3.8 GRATINGS (NOT USED)

3.9 STEEL LINTELS

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

3.10 SHELF ANGLES

A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
B. Provide expansion space at end of members.

3.11 PLATE DOOR SILL (NOT USED)

3.12 SAFETY NOSINGS (NOT USED)

3.13 LADDERS

A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.

3.14 RAILINGS

A. Steel Posts:
   1. Secure fixed posts to concrete with pourable grout (typical).
   2. Install sleeves in concrete formwork.

3. Set post in sleeve and pour grout to surface. Apply beveled bead of urethane sealant at perimeter of post as specified in Section 07 92 00, JOINT SEALANTS – on exterior posts.
4. Secure removable posts to concrete by setting posts in close fitting pipe sleeves without grout.
5. Secure posts to steel with welds.

B. Anchor to Walls:
1. Anchor rails to solid masonry with machine screws through flanged fitting to steel plate.
   a. Anchor steel plate to solid masonry with expansion bolts.
   b. Anchor steel plate to hollow masonry with toggle bolts.
2. Anchor flanged fitting with toggle bolt to steel support in frame walls.

C. Handrails:
1. Anchor brackets for metal handrails as detailed.
2. Install brackets within 300 mm (12 inches) of return of walls, and at evenly spaced intermediate points not exceeding 1200 mm (4 feet) on centers unless shown otherwise.
3. Expansion bolt to solid masonry.
4. Toggle bolt to installed supporting frame wall and to hollow masonry unless shown otherwise.

3.15 CATWALK AND PLATFORMS (NOT USED)

3.16 SIDEWALK DOOR, TRAP DOORS, AND FRAMES (NOT USED)

3.17 SCREENED ACCESS DOOR (NOT USED)

3.18 STEEL COMPONENTS FOR MILLWORK ITEMS

A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.19 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items, as recommended by the metal manufacture and protected from damage until completion of the Project.

- - - E N D - - -

SECTION 05 51 00
METAL STAIRS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies steel stairs with railings.

B. Types:

1. Closed riser stairs with concrete-filled treads and platforms.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Concrete fill for treads and platforms: Section 03 30 00, CAST-IN-PLACE CONCRETE.

C. Wall handrails and railings for other than steel stairs: Section 05 50 00, METAL FABRICATIONS and Section 10 26 00, WALL AND DOOR PROTECTION.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.

C. Fabrication qualifications.

D. Installer qualifications.Ff

E. Calculations.

F. Welding qualifications.

1.4 QUALITY ASSURANCE:

A. Fabricator: A firm with a minimum of three (3) years’ experience in type of work required by this Section. Submit fabricator qualifications.

B. Installer: A firm with a minimum of three (3) years’ experience in type of work required by this Section. Submit installer qualifications.

C. Calculations: Provide professionally prepared calculations and certification of performance of this work, signed and sealed by a Professional Engineer registered in the state where the work is located. Perform structural design of the stair including supports for the metal stair frame. Indicate how Design Criteria as specified have been incorporated into the design.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M and AWS D1.3/D1.3M.

1.5 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 basic designation.

B. American Society of Mechanical Engineers (ASME):

B18.2.1-12.....Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

B18.2.3.8M-81(R2005)....Metric Heavy Lag Screws

B18.6.1-81(R2008).....Wood Screws (Inch Series)

B18.6.3-13.....Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)

B18.6.5M-10.....Metric Thread Forming and Thread Cutting Tapping Screws

B18.6.7M-10.....Metric Machine Screws

B18.22M-81(R2010).....Metric Plain Washers

B18.21.1-09.....Washers: Helical Spring-Lock, Tooth Lock, and Plain Washer (Inch Series)

C. ASTM International (ASTM):

A36/A36M-14.....Carbon Structural Steel

A47/A47M-99 (R2014).....Ferritic Malleable Iron Castings

A48/A48M-03(R2012).....Gray Iron Castings

A53/A53M-12.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A153/A153M-09.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-14.....Carbon Steel Bolts, Studs and Threaded Rod 60,000 PSI Tensile Strength

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

A786/A786M-05(R2009)....Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates

A1008/A1008M-13.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy, High-Strength

Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

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

D. American Welding Society (AWS):

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

D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel

E. The National Association of Architectural Metal Manufactures (NAAMM) Manuals:

AMP 510-92.....Metal Stairs Manual

F. American Iron and Steel Institute (AISI):

S100-12.....Design of Cold-Formed Steel Structural Members

G. National Fire Protection Association (NFPA):

101-15.....Life Safety Code

H. Society for Protective Coatings (SSPC):

Paint 25(1997; E 2004)..Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA:

A. Design stairs to support live load of 4.79 kN/sq. m (100 lbf/ sq. ft.) and a concentrated load of 1.33 kN (300 lbf) applied on an area of 2580 sq. mm (4 sq. in.).

1. Uniform and concentrated loads need not be assumed to act concurrently.
2. Provide stair framing capable of withstanding stresses resulting from railing loads in addition to the loads specified above. Limit deflection of treads, platforms, and framing members to L/360 or 6.4 mm (1/4 inch), whichever is less.

B. Provide structural design, fabrication and assembly in accordance with requirements of NAAMM AMP 510, except as otherwise specified or shown.

C. Design handrails and top rails of guards to support uniform load of not 0.73 kN/m (50 lbf/ft.) applied in any direction and a concentrated load of 0.89 kN (200 lbf) applied in any direction. Uniform and concentrated loads need not be assumed to act concurrently.

D. Infill of guards to support concentrated load of 0.22 kN (50 lbf) applied horizontally on an area of 0.093 sq. m (1 sq. ft.).

E. Design fire stairs to conform to NFPA 101.

2.2 MATERIALS:

A. Steel Pipe: ASTM A53/A53M, Standard Weight, zinc coated.

B. Sheet Steel: ASTM A1008/A1008M.

C. Structural Steel: ASTM A36/A36M.

D. Steel Floor Plate: ASTM A786/A786M.

E. Steel Decking: Form from zinc-coated steel conforming to ASTM A653/A653M, with properties conforming to AISI S100.

F. Steel Plate: ASTM A1011/A1011M.

G. Iron Castings: ASTM A48/A48M, Class 30.

H. Malleable Iron Castings: ASTM A47/A47M.

I. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.

2.3 FABRICATION GENERAL:

A. Fasteners:

1. Conceal bolts and screws wherever possible.
2. Use countersunk heads on exposed bolts and screws with ends of bolts and screws dressed flush after nuts are set.
3. Galvanized zinc-coated fasteners in accordance with ASTM A153/A153M and used where built into exterior walls or floor systems. Select fasteners for the type, grade, and class required for the installation of steel stair items.
4. Standard/regular hexagon-head bolts and nuts conforming to ASTM A307, Grade A.
5. Square-head lag bolts conforming to ASME B18.2.3.8M, ASME B18.2.1.
6. Machine Screws: Cadmium-plated steel conforming to ASME B18.6.7M, ASME B18.6.3.
7. Wood Screws: Flat-head carbon steel conforming to ASME B18.6.5M, ASME B18.6.1.
8. Plain Washers: Round, general-assembly-grade, carbon steel conforming to ASME B18.22M, ASME B18.21.1.
9. Lockwashers: Helical spring, carbon steel conforming to ASME B18.2.1, ASME B18.2.3.8M.

B. Welding:

1. Structural steel, AWS D1.1/D1.1M, and sheet steel, AWS D1.3/D1.3M.

2. Where possible, locate welds on unexposed side.
3. Grind exposed welds smooth and true to contour of welded member.
4. Remove welding splatter.

C. Remove sharp edges and burrs.

D. Fit stringers to head channel and close ends with steel plates welded in place where shown.

E. Fit face stringer to newel post by tenoning into newel post, or by notching and fitting face stringer to side of newel where shown.

F. Shop Prime Painting: Shop-prime steelwork with red-oxide primer in accordance with SSPC Paint 25.

G. Form exposed work true-to-line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 0.8 mm (1/32 inch), and bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

H. Continuously weld corners and seams in accordance with the recommendations of AWS D1.1/D1.1M. Grind smooth exposed welds and flush to match and blend with adjoining surfaces.

I. Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts.

J. Provide and coordinate anchorage of the type indicated with the supporting structure. Fabricate anchoring devices, space as indicated and required to provide adequate support for the intended use of the work.

K. Use hot-rolled steel bars for work fabricated for bar stock unless work is indicated or specified as fabricated from cold-finished or cold-rolled stock.

2.4 RAILINGS:

A. Fabricate railings, including handrails, from steel pipe.
1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
2. Wall handrails are provided under Section 05 50 00, METAL FABRICATIONS.

B. Return ends of handrail to wall and close free end.

C. Provide standard terminal castings where fastened to newel.

D. Space intermediate posts not over 1828 mm (6 feet) on center between end post or newel post.
E. Fabricate handrail brackets from cast malleable iron.
F. Provide standard terminal fittings at ends of post and rails.

2.5 CLOSED RISER STAIRS:

A. Provide treads, risers, platforms, railings, stringers, headers, and other supporting members.
B. Fabricate pans for treads and platforms, and risers from sheet steel.
C. Form risers with sanitary cove.
D. Fabricate stringers, headers, and other supporting members from structural steel.
E. Construct newel posts of steel tubing having wall thickness not less than 5 mm (3/16-inch), with forged-steel caps and drops.

2.6 INDUSTRIAL STAIRS (NOT USED)

PART 3 - EXECUTION

3.1 STAIR INSTALLATION:

A. Provide hangers and struts required to support the loads imposed.
B. Perform job-site welding and bolting as specified for shop fabrication.
C. Set stairs and other members in position and secure to structure as shown.
D. Install stairs plumb, level and true-to-line.
E. Provide steel closure plate to fill gap between the stringer and surrounding wall. Weld and apply primer, ready to accept paint finish.

3.2 RAILING INSTALLATION:

A. Install standard terminal fittings at ends of posts and rails.
B. Secure brackets, posts, and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.
C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3658 mm (1/8-inch in 12 feet).
D. Set posts plumb and aligned to within 3 mm in 3658 mm (1/8-inch in 12 feet).

3.3 FIELD PRIME PAINTING:

A. Touch-up abraded areas with same primer paint used for shop priming.

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies wood blocking, nailers, and rough hardware.

1.2 RELATED WORK:

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings showing connection details, fasteners, connections, and dimensions.

C. Manufacturer’s Literature and Data:

1. Submit data for hardware and adhesives.
2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

D. Manufacturer’s certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery to Project 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 overhanging roof with sufficient end wall to protect lumber from driving rain.

1.5 QUALITY ASSURANCE:

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

1.6 GRADING AND MARKINGS:

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

1.7 APPLICABLE PUBLICATIONS:

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

B. American Wood Council's (AWC) Wood Design Standards Committee:

NDS-15.....National Design Specification for Wood Construction

WCD1-01.....Details for Conventional Wood Frame Construction

C. American Society of Mechanical Engineers (ASME):

B18.6.1-81(R2008).....Wood Screws

D. The Engineered Wood Association (APA):

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

E. 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

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

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

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

F. American Wood Protection Association (AWPA – fka the American Wood-Preservers' Association): AWPA Book of Standards

T1.....Use Category System: Processing and Treatment Standard

1. Preservative retention and penetration requirements.
2. Processing limitations.
3. Quality control and inspection requirements.

U1.....Use Category System: User Specifications for Treated Wood

1. UC2 – Interior/Damp.
2. UCF – Fire Retardant.
   a. UCFA – Fire Retardant, Interior.

G. Commercial Item Description (CID):

A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

H. Military Specification (Mil. Spec.):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

I. U.S. Department of Commerce Product Standard (PS)

PS 1-95.....Construction and Industrial Plywood

PS 20-10.....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. Blocking nailers, and similar items 101 mm (nominally 4 inches) and narrower Standard Grade; and, members 152 mm (nominally 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 Project site.
   a. Boards and lumber 50 mm (nominally 2 inches) and less in thickness: 19 percent or less.
   b. Lumber over 50 mm (nominally 2 inches) thick: 25 percent or less.

E. Fire-Retardant Treatment:
1. Comply with Mil Spec. MIL-L-19140, Category UCFA per AWPA U1, and AWPA T1.
2. Treatment and performance inspection per AWPA T1, by an independent and qualified testing agency that establishes performance ratings.

F. Preservative Treatment:
1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood nailers, edge strips, blocking, crickets, curbs, cant, vent strips, and other members provided in connection with roofing and flashing materials.
3. Treat other members specified as pressure-preservative treated (PPT).
4. Preservative treat by the pressure method complying with Category UC2 per AWPA Standards U1 and T1, except that 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 PLASTIC LUMBER (NOT USED)

2.3 PLYWOOD:

A. Comply with PS 1.

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

2.4 STRUCTURAL-USE PANELS (NOT USED)

2.5 ROUGH HARDWARE AND ADHESIVES:

A. 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.

B. Washers

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

C. Screws:

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

D. Nails:

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

E. Connectors:

1. Fabricate of ASTM A653/A653M, Grade A; steel sheet not less than 1.3 mm (0.052 inch) thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming, and assembly of parts.

2. Angles: Angle designed with bendable legs to provide three-way anchors.
3. Straps:
   a. Designed to provide wind and seismic ties with sizes as shown or specified.
   b. Strap ties not less than 32 mm (1-1/4 inches) wide.
   c. Punched for fastener.
4. Joint Plates:
   a. Steel plate punched for nails.
   b. Steel plates formed with teeth or prongs for mechanically clamping plates to wood.
   c. Size for axial eccentricity, and fastener loads.

F. Adhesives:
   2. For Laminated Wood: ASTM D2559.

PART 3 - EXECUTION

3.1 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
   1. AFPA NDS for connectors.
   2. AFPA WCD1 for nailing unless specified otherwise.
   3. APA E30 for installation of plywood.

B. Fasteners:
   1. Nails.
      a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
      b. Use special nails with connectors.
      c. Use 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
      d. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.
      e. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with anchors.
   2. Bolts:
      a. Fit bolt heads and nuts bearing on wood with washers.
      b. Countersink bolt heads flush with the surface of nailers.

c. Provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
d. Provide toggle bolts to hollow masonry or sheet metal.
e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.

3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
   a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
   b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
4. Power-actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts, or similar fastening.
6. Screws to Join Wood:
   a. Where shown or option to nails.
   b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
   c. Spaced same as nails.
7. Installation of Connectors:
   a. Conform to applicable requirements of the AFPA NDS.
   b. Fit wood to connectors and drill holes for fasteners so wood is not split.

C. Cut, notch, or bore in accordance with AFPA WCD1 for passage of ducts wires, bolts, pipes, and conduits and to accommodate other work. Repair or replace miscut, misfit, or damaged work.

D. Blocking and Nailers:
1. Install blocking and nailers 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.

E. Rough Bucks:

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

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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. Custom Cabinetry.

1.2 RELATED REQUIREMENTS

A. Adhesive, Paint, and Finish VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
B. Woodwork Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.
C. Blocking: Section 06 10 00, ROUGH CARPENTRY.
D. Wood doors: Section 08 14 00, WOOD DOORS.
E. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.
F. Countertops: Division 12, FURNISHINGS.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. ASTM International:
   1. E84-15b - Surface Burning Characteristics of Building Materials.
C. American Hardboard Association (AHA):
   1. A135.4-04 - Basic Hardboard.
D. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute (AWI/AWMAC/WI):
   1. AWS-14 - Architectural Woodwork Standards, Edition 2.
E. Federal Specifications (Fed. Spec.):
   1. A-A-1936A - Adhesive, Contact, Neoprene Rubber.
F. National Particleboard Association (NPA):
   1. A208.1-09 - Wood Particleboard.
G. National Electrical Manufacturers Association (NEMA):
   1. LD 3-05 - High-Pressure Decorative Laminates.
H. U.S. Department of Commerce, Product Standard (PS):
   1. PS1-07 - Construction and Industrial Plywood.

1.4 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting at Project site minimum 30 days before beginning Work of this Section.
   1. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
      a. Installation schedule.
      b. Installation sequence.
      c. Preparatory work.
      d. Protection before, during, and after installation.
      e. Installation.
      f. Terminations.
      g. Transitions and connections to other work.
      h. Other items affecting successful completion.
   2. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Show size, configuration, and fabrication and installation details.
   2. Millwork items - Half-full-size scale for sections and details; 1: 50 (1/4 inch) scale for elevations and plans.

C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.

D. Samples:
   1. Plastic Laminate Finished Plywood and Particleboard: 150 mm by 300 mm (6 by 12 inches), for each type and color.
      a. Submit quantity required to show full color and texture range.
   2. Approved samples may be incorporated into work.

E. Sustainable Construction Submittals:
   1. Low Pollutant-Emitting Materials:
      a. Show volatile organic compound types and quantities.
      b. Certify each composite wood product contains no added urea formaldehyde.

F. Certificates: Certify each product complies with specifications.

1. Moisture content of materials.

G. Qualifications: Substantiate qualifications comply with specifications.
   1. Fabricator with project experience list.
   2. Installer with project experience list.

1.6 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.
      a. Project Experience List: Provide contact names and addresses for completed projects.

B. 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.

C. Workmanship: Comply with the following standards of the AWS.
   1. Comply with "Cabinet Design Series" (CDS) design standards of the AWS: CDS numbers are indicated on Drawings and denote typical designs.
   2. Per Section 10 - Casework of the AWS: Custom Grade for plastic-laminate-clad wood architectural cabinets.

1.7 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.

1.8 FIELD CONDITIONS

A. Environment:

1. Conform to AWS Appendix B; 12 – Installation, unless requirements in this Section are more stringent.
2. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
3. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
4. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
5. Do not install finish lumber or millwork in any room or space where wet-process systems are 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.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design acoustical panel complying with specified performance:
   1. Surface Burning Characteristics: When tested according to ASTM E84.
      a. Flame Spread Rating: 25 maximum.
      b. Smoke Developed Rating: 450 maximum.

B. Loading:
   1. Design wall-mounted woodwork to carry a uniform live load of 200 pounds per linear foot.
   2. Provide maximum load performance of 50 psf of total distributed load (AWS Appendix B; 10 - Casework) on any single shelf.
   3. Deflection: 1/4 inch maximum.

2.2 MATERIALS

A. Grading and Marking: Factory-mark lumber and plywood with grade stamp 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.

b. Millwork: Actual size as shown or specified.

2. Moisture Content:

a. 32 mm (1-1/4 inches) or Less Nominal Thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.

b. Other Materials: According to standards under which the products are produced.

c. Treat wood for maximum flame spread of 25.

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 construction.

b. Plastic Laminate Plywood Cores:

1) Exterior Type, any species group.

2) Veneer Grade: A-C.

c. Other: As specified for item.

D. Particleboard: NPA A208.1, Type 1, Grade 1-M-2 (Exterior Glue) with binder containing no urea formaldehyde.

1. Thickness: Comply with Standard 16.9.1 in Assembly Rule 10.4.7 of the AWS using uniformly distributed total applied weight of 200 pounds per shelf span while being subject to a load capacity of 50 pounds per square foot.

E. Building Board (Hardboard):

1. ANSI/AHA A135.4, 6 mm (1/4 inch) thick unless specified otherwise.

F. Plastic Laminate: NEMA LD 3.

1. Exposed Laminate Surfaces: Grade HGL.

2.3 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.

C. Sustainable Construction Requirements:

1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for the following products:
   a. Non-flooring adhesives and sealants.
   b. Aerosol adhesives.
   c. Paints and coatings.
   d. Wall base and accessories.
   e. Composite wood.

2.4 FABRICATION

A. General:

1. AWS Custom Grade for interior millwork.
2. Plywood, minimum 13 mm (1/2 inch), unless otherwise shown on Drawings or specified.
3. Plastic Laminate Work:
   a. Factory-glued to either a plywood or a particleboard core, thickness as shown on Drawings or specified.
   b. Cover exposed edges with plastic laminate, except where plastic edge strips are shown on Drawings or specified.
   c. Use backing sheet on concealed large panel surface when decorative face does not occur.

2.5 ACCESSORIES

A. 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 EXAMINATION AND 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

A. Installation:
   1. Provide washers under bolt heads where no other bearing plate occurs.
   2. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
   3. Plumb and level items unless shown otherwise.
   4. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.
   5. Provide fillers where indicated. Fillers wider than 2-1/2-inches will not be acceptable (AWS Section 10 - Casework; 6.1.10).
   6. Provide scribes where indicated. Scribes wider than 2-1/2-inches will not be acceptable (AWS Section 10 - Casework; 6.1.10).

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 06 61 16
SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes -- but is not limited to -- the following:
   1. Horizontal elements (fabricated using 1/2-inch-thick material).
      a. Window stools (Match existing configuration(s)).
   2. Vertical elements (fabricated using 1/4-inch-thick material).
      a. Vertical cladding.
   3. Trim.

B. Related work specified elsewhere may be, but are not limited to, those listed below:
   1. Section 06 10 00 - Rough Carpentry: Blocking.
   2. Section 09 30 00 - Tiling:
      a. Cementitious backer board for solid-surface wall cladding.
   3. Section 12 36 00 – Countertops: Countertop construction and materials and items installed in countertops.

1.02 DEFINITION

A. Solid surfacing is defined as non-porous, homogeneous material maintaining the same composition throughout the piece, with a composition of polymer, aluminum-trihydrate filler, pigment (colorant), and catalyst to improve surface hardness and stain-resistance.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).

B. ANSI Z124.3 - American National Standard for Plastic Lavatories.

C. ANSI Z124.6 - American National Standard for Plastic Sinks.

D. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Board Panel Materials.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. NFPA 101 - Life Safety Code.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. Submittals: Submit in accordance with Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data: For each type of product and process specified in this Section and incorporated into items of solid-surfacing work during fabrication, finishing, and installation.

C. Shop Drawings:
   1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
      a. Show full size details, edge details, thermoforming requirements, attachments, and the like.

b. Show locations and sizes of furring, blocking, including concealed blocking/strapping and reinforcement specified in other sections of this Project Manual.
c. Show locations and sizes of cutouts and holes for items installed in solid surfacing.
   1) Plumbing fixtures.
   2) Other items installed in solid surfacing.
d. For building components that use multiple sheets of solid-surface selections with veining, identify orientation of veining in individual sheets and configuration of seams.
e. Show locations of dye-lot matched repair material left on-site.

D. Samples for Selection: When a selected color/pattern is not available, submit 12-inch-square samples of a minimum of four proposed colors/patterns in specified gloss.

E. Samples for Verification: Submit manufacturer's typical 2-inch-square chip for each selected color/pattern.

F. Certificates: For each type of product, signed by product manufacturer, certifying that they comply with requirements.

G. Qualification Statements: Provide copy of certification number for fabricator/installer.

H. Project Closeout Submittals:
   1. Maintenance Data): Submit manufacturer's care and maintenance data, including repair and cleaning instructions -- and maintenance kit for finishes.
   2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Work of this Section shall be provided by a shop that employs skilled workers who custom-fabricate products that are similar to those required for this Project and that have a record of successful in-service performance.
   1. Work of this Section shall be a shop that is certified in writing by the manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver no components to Project site until areas are ready for installation.

B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.
   1. Provide protective coverings to prevent physical damage or staining following installation for duration of the Project.

1.07 WARRANTY

A. Manufacturer's Warranty: Provide against defects in materials.
   1. Warranty shall provide material and labor to repair or replace defective materials.
   2. Exclusions: Damage caused by physical or chemical abuse or damage from excessive heat.
   3. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. See Drawings and specifications below for Manufacturers and selected products, colors, and patterns.

2.02 MATERIALS

A. Solid Polymer Components: Cast, non-porous, filled polymer, not coated, laminated or of composite construction with through-body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified
   1. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and/or polishing.

B. Thickness of Sheet Material:
   1. Vertical Applications: 1/4 inch, unless otherwise indicated.
   2. Horizontal Applications: 1/2 inch, unless otherwise indicated.

C. Edge Treatment: See Part-2 article entitled "Fabrication."

D. Fire-Test-Response Characteristics: Provide with the following surface-burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.
   3. Interior Finish (per NFPA 101): Class A.

2.03 ACCESSORIES

A. Joint Adhesive: Manufacturer's standard one or two-part adhesive kit to create inconspicuous, non-porous joints by chemical bond.

B. Panel Adhesive: Manufacturer's standard neoprene-based (organic) panel adhesive complying with ANSI A108/A118/A136.1; UL-listed.

C. Mastic: Product as recommended by manufacturer.

D. Sealant: Manufacturer's standard mildew-resistant UL-listed silicone sealant in colors matching components.

2.04 FACTORY-FABRICATION

A. Shop-Assembly:
   1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and manufacturer's printed Instructions and technical bulletins.
      a. Solid surface selections with veining will require orientation of sheets and configuration of seams based on aesthetic judgment resulting in a lower sheet yield.
         1) Where veining changes direction, use seams that are mitered (when viewed in plan). Seams that simply butt the machine direction and the traverse direction of the solid-surface sheet together at right angles will not be acceptable.
   2. Form joints between components using manufacturer's standard joint adhesive with inconspicuous reinforced joints. Provide seam reinforcing strips at seams, whether factory- or field-fabricated.
      a. Locate all seams directly over supports.
   3. Provide factory-cutouts for plumbing fittings and bath accessories as indicated on the Drawings.

4. Rout and finish component edges with clean returns. Radius all inside corners of cutouts as large as – but not less than – 1/4 inch. Sharp inside corners are not permitted.
   a. Rout cutouts, radii, and contours to template.
   b. Smooth edges to 1/8-inch radius.
   c. Provide minimum 1-inch radius on exposed outside corners of solid-polymer caps not abutting equipment, wall, or other vertical surface.
   d. Reinforce inside corners, narrow pieces, cantilevered overhangs, and stress points against breakage by laminating an additional thickness of solid polymer material on concealed face.
   e. Finishing: Ensure that completed pieces are uniformly finished. Provide matte finish unless otherwise indicated.
   f. Repair or reject defective and inaccurate work.

B. Vertical Surfaces with Hard Seams: 1/4-inch-thick with butt joints between sheets made with manufacturer’s joint adhesive matching color of solid polymer material; adhesively applied to solid substrates; 1/8-inch-wide expansion joints filled with color-matching silicone at between 10 and 15 feet on center.

2.05 FINISHES

A. Color(s): See Schedule for Finishes.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances, and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install components plumb, level, and rigid, scribed to adjacent finishes, in accordance with approved Shop Drawings and Product Data.

B. Provide product in the largest pieces available.

C. Cut and finish component edges with clean returns.

D. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
   1. Exposed joints/seams will not be acceptable.
   2. Provide proper reinforcing of all field joints.

E. Attach castoffs of dye-lot-matched material, adhered to the underside of each countertop, to be used for future repairs.

F. Solid-Surfacing Wall Panels:
   1. Adhere solid-surfacing material to wall substrate using manufacturer's recommended adhesive.
   2. Provide void space where wall panels are restrained, at floors, ceilings or inside corners, to allow for expansion and contraction of solid-surfacing material.
      a. Inside corners: Provide void space for expansion equal to a minimum of 150 percent of calculated wall expansion.
      b. Panel overlap at inside corners: Provide a minimum of 50 percent of the thickness of solid-surfacing material.

c. Joints at ceilings and floors: Minimum 1/8 inch gap, fill with silicone sealant.

3. Seal joint between bottom of solid-surfacing panels and, flash cove cap strip or flooring material.

3.03 REPAIR

A. Damaged work, which cannot be repaired to Architect's satisfaction, shall be replaced.

3.04 CLEANING AND PROTECTION

A. Clean components during installation.

B. Remove adhesives, sealants, and other stains.

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SECTION 06 82 13
SHEET RESIN FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes sheet resin fabrications.

B. Related work specified elsewhere may be, but are not limited to, those listed below:
   1. Section 06 20 00 - Finish Carpentry.
   2. Division 26 – Electrical (and Luminaire Schedule on the Drawings): Custom and semi-custom lighting fixtures with sheet-resin components.

1.02 SUBMITTALS

A. Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.

B. Shop Drawings: Show attachments to other work using 1/4-inch plans, elevations, sections, details.

C. Samples for Verification: Submit minimum 36 inch by 48-inch sample for each type, texture, pattern, and color of sheet resin fabrication.

D. Maintenance Data: Submit manufacturer’s care and maintenance data, including care, repair, and cleaning instructions. Include in Project closeout documents.

1.03 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Ensure compliance with the following requirements.
   1. Rate of Burning (for a nominal thickness of 0.060 inch per ASTM D635): Class CC1.
   2. Self-Ignition Temperature (ASTM D1929): Pass (greater than 650 degrees Fahrenheit).
   3. Density of Smoke (ASTM D2843): Pass (less than 75 percent).
   4. Surface-Burning Characteristics (ASTM E84): IBC Interior Finish Class B and NFPA Interior Finish Class 2.
      a. Flame-Spread Index: 75 or less.
      b. Smoke-Generated Index: 450 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver Sheet Resin Fabrications components and accessories to Project site until areas are ready for installation

B. Handle materials to prevent damage to finished surfaces.
   1. Provide protective coverings to prevent damage or staining following installation for duration of Project.

C. Before installing, permit materials to reach room temperature.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not install Sheet Resin Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Resin Sheet: Engineered polyester resin, glycol-modified.
   1. Thickness(es):
      a. Field-Fabricated Lighted Panel: Field+Ghost, a 6.3mm-thick translucent layer factory-laminated to a 1/4-inch-thick decorative panel.
   2. Finish(es): See Finish Legend.

B. Interlayer Materials: Compatible with polyester and bonding process to create a monolithic sheet of material when complete.

2.02 FABRICATION

A. General: Fabricate to designs, sizes, and thicknesses indicated and to comply with indicated standards.
   1. Sizes, profiles, and other characteristics are indicated in the Schedule of Finishes and on the Drawings.

B. Comply with manufacturer’s written recommendations for fabrication.

C. Machining: Ensure that material is not chipped or warped by machining operations.

D. Forming: As indicated on the Drawings. Comply with manufacturer’s written instructions.

E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

F. Tolerance: Maximum deflection of 1/16 inch over 12 inches.

2.03 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
   1. Mounting Hardware: As recommended by the sheet resin manufacturer.

B. Cleaner: Type recommended by manufacturer.

C. Fasteners: Use screws designed specifically for plastics.
   1. Self-threading screws are acceptable for permanent installations.

D. Bonding Cements: Solvent or adhesives, suitable for use with product and application.

E. Drilled-Panel Wall Anchors: Manufacturer’s recommended wall anchor.
   1. Provide extensions to accommodate thicknesses scheduled or illustrated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where installation of sheet resin fabrications will occur, with Installer present, for compliance with manufacturer’s requirements.
   1. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.02 INSTALLATION

A. General: Comply with manufacturer’s written instructions.

B. Shop-fabricate items to the greatest degree possible.

C. Utilize fasteners, adhesives, and bonding agents recommended by manufacturer for type of installation indicated.
   1. Material that is chipped, warped, hazed, or discolored as a result of installation or fabrication methods will be rejected.

D. Install components plumb, level, and rigid, scribed to adjacent finishes, in accordance with approved Shop Drawings and Product Data.

E. Form field joints using manufacturer’s recommended procedures.
   1. Locate seams in panels so that they are not directly in line with seams in substrates.

3.03 CLEANING AND PROTECTION

A. Protect surfaces from damage.
   1. Replace damaged work that cannot be repaired to COR’s satisfaction.

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SECTION 07 01 51
EXISTING ROOF MODIFICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Section Includes: Labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Roofing penetrations and remodeling of existing roofing to accommodate new work.
   2. Protection of existing roofing during remodeling operations.
   3. Preservation of the Owner's existing roofing warranty.

B. Products Installed But Not Furnished under This Section: Install the following items as furnished by other sections in this Project Manual:
   1.
   2. Division 23 - Heating, Ventilating, and Air Conditioning:
      a. Roof curbs, penetrations, and supports for HVAC equipment and piping.

C. Related Work: The following items are not included in this Section and will be performed under other sections in this Project Manual:
   1. Section 06 10 00 - Rough Carpentry: Wood nailers, curbs, and blocking.
   2. Section 07 60 00 – Flashing and Sheet Metal: Metal roof penetration flashings, flashings, and counterflashings.
   3. Section 07 92 00 - Joint Sealants: Sealants.

1.02 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work of this Section.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Installer Certificates: Signed by membrane roofing system manufacturer certifying that Installer is approved, authorized, or licensed by membrane roofing system manufacturer to install and modify roofing system.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain components for roofing system from – or approved by – membrane roofing system manufacturer warranting the roof.

B. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01. Review methods and procedures related to roofing system including, but not limited to, the following:
   1. Meet with the Owner, testing and inspecting agency representative, roofing Installer, membrane roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including membrane roofing system manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.06 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to membrane roofing system manufacturer's written instructions and warranty requirements.

1.07 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during remodeling, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.
   1. Notify warrantor of existing roofing system upon completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

B. Roofing Installer’s Warranty: The roofing subcontractor shall supply Owner with a minimum two-year workmanship warranty for each roof. In the event any work related to the roofing, flashing, or metalwork is found to be defective within two years of substantial completion, the roofing installer shall remove and replace such at no additional cost. The roofing installer’s warranty obligation shall run directly to the building owner, and a signed copy of the roofing warranty shall be sent to the membrane roofing system manufacturer.

PART 2 - PRODUCTS

2.01 ROOFING ASSEMBLY MATERIALS

A. Roofing Materials: Match existing. Engage services of a roofing consultant if type of roof and roof assembly cannot be readily determined. Provide auxiliary materials compatible with membrane roofing and recommended by membrane roofing system manufacturer for intended use.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

C. Miscellaneous Accessories: Provide the following.
   1. Pourable sealers.
   2. Preformed cone and vent sheet flashings.

3. Preformed inside and outside corner sheet flashings.
4. T-joint covers.
5. In-seam sealants.
6. Termination reglets.
7. Cover strips.
8. Other accessories.

2.02 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure. Do not permit the passage of water.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing system manufacturer, based on testing and field experience.

C. Roofing System Design: Roofing system shall be designed to withstand Code-required loads and wind speeds.

D. Flashings: Provide base flashings, perimeter flashings, detail flashings, and component materials that comply with requirements and recommendations in the following, as applicable.
   1. For Above Deck Roof Components: FMG Property Loss Prevention Data Sheet 1-29.
   2. For Perimeter Flashings: FMG Property Loss Prevention Data Sheet 1-49.
   3. For Construction Details:
      a. NRCA Roofing and Waterproofing Manual (Fourth Edition).
      b. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

2.03 WALKWAYS

A. Flexible Walkways at New Equipment: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with conditions affecting performance of roofing system.
   1. Verify that roof openings and penetrations are in place and set and braced – and that roof drains are securely clamped in place.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Moisture Testing: Perform tests recommended by membrane roofing system manufacturer and as follows. Proceed with installation only after substrates pass testing.
   1. Relative humidity probe and digital meter method according to ASTM F 2170.
   2. Proceed with installation only after substrates have a maximum relative-humidity-measurement reading of less than 75 percent in 72 hours.

3.02 PREPARATION AND INSTALLATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to membrane roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

D. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

E. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

F. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

G. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

H. Terminate and seal top of sheet flashings.

3.03 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to membrane roofing system manufacturer's written instructions.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.05 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

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SECTION 07 08 00

FACILITY EXTERIOR CLOSURE COMMISSIONING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 07 and Division 08.

B. This Project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIRMENTS. A Commissioning Agent (CxA) appointed by the VA will manage the commissioning process.

1.2 RELATED WORK

A. Section 01 00 00 GENERAL REQUIREMENTS.

B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

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

1.3 SUMMARY

A. This Section includes requirements for commissioning the Facility exterior closure, related subsystems and related equipment. This Section supplements the general requirements specified in Section 01 91 00 General Commissioning Requirements.

B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding commissioning processes and procedures, as well as roles and responsibilities for all Commissioning Team members.

1.4 DEFINITIONS

A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

1.5 COMMISSIONED SYSTEMS

A. Commissioning of a system or systems specified in Division 07 and Division 08 is part of the construction process. Documentation and testing of these systems, as well as training of the VA’s Operation and Maintenance personnel in accordance with the requirements of Section 01 91 00 and of Division 07 and 08, is required in cooperation with the VA and the Commissioning Agent.

B. The Facility exterior closure systems commissioning will include the systems listed in Section 01 91 00 General Commissioning Requirements.

1.6 SUBMITTALS

A. The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.

B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION INSPECTIONS

A. Commissioning of the building envelope systems will require inspection of individual elements of the envelope construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent in accordance with Section 01 91 00 and the Commissioning plan to schedule envelope inspections as required to support the Commissioning Process.

3.2 PRE-FUNCTIONAL CHECKLISTS

A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot-check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the

Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

3.3 CONTRACTORS TESTS

A. Contractor tests as required by other sections of Division 07 or Division 08 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:

A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

3.5 TRAINING OF VA PERSONNEL

A. Training of the VA operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the requirements of Section 01 91 00. The instruction shall be

scheduled in coordination with the VA Resident Engineer after submission and approval of formal training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 07 and 08 Sections for additional Contractor training requirements.

----- END -----

SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermal insulation.
      a. Board or block insulation at foundation perimeter.
      b. Board or block insulation behind masonry veneer on exterior walls.
   2. Acoustical insulation.
      a. Batt and blanket insulation at interior framed partitions.

1.2 RELATED REQUIREMENTS

A. Adhesives VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Safing Insulation: Section 07 84 00, FIRESTOPPING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.

B. ASTM International (ASTM):
   1. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
   2. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
   3. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
   4. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
   5. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
   6. 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.
   7. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
   8. E84-15a - Surface Burning Characteristics of Building Materials.

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.

C. Sustainable Construction Requirements:

1. Insulation Recycled Content:
   a. Polyisocyanurate/polyurethane rigid foam: 9 percent recovered material.
2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
   a. Non-Flooring Adhesives and Sealants.

2.2 THERMAL INSULATION

A. Perimeter Insulation In Contact with Soil:

1. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX.

B. Masonry Veneer Wall Insulation:

1. Mineral Fiber Board: ASTM C612, Type IVB unfaced non-combustible semi-rigid mineral-wool insulation board for use as the code-mandated “thermal barrier” between foam-plastic insulation and building occupants.
2. Polyurethane or Polyisocyanurate Board: ASTM C591, Type I, with vapor retarder facing; maximum permeance 29 ng/Pa/s/sq. m (0.5 perms).

2.3 ACOUSTICAL INSULATION

A. Semi Rigid, Batts and Blankets:

1. Widths and lengths to fit tight against framing.
2. Mineral Fiber Batt or Blankets: ASTM C665, unfaced.
3. Maximum Surface Burning Characteristics: ASTM E84.
   a. Flame Spread Rating: 25.
   b. Smoke Developed Rating: 450.

2.4 ACCESSORIES

A. Fasteners:

1. Screws: ASTM C954 or ASTM C1002, size and length to suit application with washer minimum 50 mm (2 inches) diameter.

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 (COR) consideration.

B. Install board insulation with joints close and flush, in regular courses, and with end joints staggered.

C. Install batt and blanket insulation with joints tight. Fill framing voids completely.

D. 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.

2. Horizontal insulation under concrete floor slab (if required):

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. Masonry Veneer Wall Insulation:

1. Install insulation on exterior faces of concrete walls.

2. Bond polyurethane or polyisocyanurate board to surfaces with adhesive.

3. Fill insulation joints with same material used for bonding.

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. Do not compress insulation below required thickness except where embedded items prevent required thickness.

B. Semi Rigid, Batts and Blankets:

1. Semi Rigid Batts and Blankets:

a. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedments.

3.5 CLEANING

A. Remove excess adhesive before adhesive sets.

3.6 PROTECTION

A. Protect insulation from construction operations.

B. Repair damage.

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SECTION 07 22 00
ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

B. Roof and deck insulation, vapor retarder, and cover board on new concrete substrates ready to receive roofing membrane.

C. Repairs and alteration work to existing roof insulation.

1.2 RELATED REQUIREMENTS

A. Non-Flooring Adhesives and Sealants VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Wood Cants and Blocking: Section 06 10 00, ROUGH CARPENTRY.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.

B. ASTM International (ASTM):

1. C1177/C1177M-13 - Glass Mat Gypsum Substrate for Use as Sheathing.
2. C1289-15 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
3. D41/D41M-11 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
4. D312-06 - Asphalt Used in Roofing.
5. D1970/D1970M-15 - Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
6. D2178/D2178M-15 - Asphalt Glass Felt Used in Roofing and Waterproofing.
7. D2822/D2822M-11 - Asphalt Roof Cement, Asbestos Containing.
8. D4586/D4586M-07(2012)e1 - Asphalt Roof Cement, Asbestos-Free.
9. E84-15a - Surface Burning Characteristics of Building Materials.
10. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.

C. FM Approvals: RoofNav-Approved Roofing Assemblies and Products.

D. National Roofing Contractors Association (NRCA):

1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.

E. UL LLC (UL):

1. Listed - Online Certifications Directory.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and installation details.
   a. Nailers, cants, and terminations.
   b. Layout of insulation showing slopes, tapers, penetrations, and edge conditions.

C. Manufacturer's Literature and Data:

1. Description of each product.

D. Samples:

1. Roof insulation, each type.
2. Fasteners, each type.

E. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Low Pollutant-Emitting Materials:
   a. Show volatile organic compound types and quantities.

F. Qualifications: Substantiate qualifications meet specifications.

1. Installer.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY

A. Comply with recommendations of NRCA Manual.

B. Deliver products in manufacturer's original sealed packaging.

C. Mark packaging legibly. Indicate manufacturer's name or brand, type, and manufacture date.

D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

A. Comply with recommendations of NRCA Manual.

B. Store products indoors in dry, weathertight facility.

C. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Insulation Thermal Performance:
   1. Overall Average R-Value: RSI-57 (R-33), minimum.
      a. At the Project Design R-Value of 5 per inch, this equates to an average thickness of 6.6 inches.
   2. Any Location R-Value: RSI-17 (R-10), minimum – but see Drawings for *greater* minimum thickness required at drains.
B. Fire and Wind Uplift Resistance: Provide roof insulation complying with requirements specified in Division 07 roofing section.

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer.
B. Sustainable Construction Requirements:
   1. Insulation Recycled Content:
      a. Rigid Foam: 9 percent total recycled content, minimum.
   2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
      a. Non-flooring adhesives and sealants.

2.3 ADHESIVES

A. Primer: ASTM D41/D41M.

B. Asphalt: ASTM D312, Type III or IV for vapor retarders.

C. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multi-component urethane adhesive formulated to adhere roof insulation to substrate or to another insulation layer.

D. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to adhere roof insulation to substrate or to another insulation layer.

E. Roof Cement: Asbestos free, ASTM D2822/D2822M, Type I or Type II; or, ASTM D4586/D4586M, Type I or Type II.

2.4 ROOF AND DECK INSULATION

A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, faced with glass fiber reinforced cellulosic felt facers on both major surfaces of the core foam.

1. Published literature from insulation manufacturer and industry trade groups notwithstanding, the Design R-Value of polyisocyanurate on this Project shall be limited to 5 per inch per NFPA testing.

C. Tapered Roof Insulation System:

1. Fabricate of polyisocyanurate. Use only one insulation material for tapered sections. Use only factory-tapered insulation.
2. Cut to provide high and low points with crickets and slopes as shown.
3. Minimum Thickness of Tapered Sections: 38 mm (1-1/2 inch).
4. Nominal Slope: 1/48 (1/4 inch per 12 inches).

2.5 INSULATION ACCESSORIES

A. Cants and Tapered Edge Strips:

1. Wood Cant Strips: Refer to Section 06 10 00, ROUGH CARPENTRY.
2. Tapered Edge Strips: 1/12 (1 inch per 12 inches), from 0 mm (0 inches), 300 mm to 450 mm (12 inches to 18 inches) wide.
   a. Cellulosic Fiberboard: ASTM C208.

B. Vapor Retarder:

1. Glass-Fiber Felts: ASTM D2178/D2178M, Type IV, asphalt-impregnated.

C. Cover Board:
   1. Glass-Mat, Water-Resistant Gypsum Roof Board: ASTM C1177/C1177M, 6 mm (1/4 inch) thick, factory-primed.

2.6 ACCESSORIES

A. Fasteners: Corrosion-resistant carbon steel fasteners and galvalume-coated steel or plastic round plates for fastening insulation to roof deck.

B. Nails: ASTM F1667; type to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with requirements of Division 07 roofing section.

B. Examine and verify substrate suitability for product installation.

3.2 PREPARATION

A. Comply with requirements of Division 07 roofing section.

B. Protect existing construction and completed work from damage.

3.3 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 (COR) consideration.

B. Attach products to meet requirements of Division 07 roofing section.

3.4 SUBSTRATE BOARD INSTALLATION (NOT USED)

3.5 VAPOR RETARDER INSTALLATION

A. General:
   1. Install continuous vapor retarder on roof decks where indicated.
   2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
   3. Seal penetrations through vapor retarder with roof cement to prevent moisture entry from below.

B. Cast-in-Place Concrete Decks:
   1. Prime deck as specified.
   2. Apply two plies of asphalt-saturated felt mopped down to deck.

3.6 INSULATION INSTALLATION

A. Insulation Installation, General:
   1. Cant Strips: Install wood cant strips specified in Section 06 10 00 ROUGH CARPENTRY at junctures of roofing system with vertical construction.

B. Insulation Thickness:
   1. Thickness of roof insulation shown on Drawings is nominal. Provide thickness required to comply with specified thermal performance.
   2. If actual insulation thickness differs from Drawings, coordinate alignment and location of roof drains, flashing, gravel stops, fascias, and similar items.
   3. Where tapered insulation is used, maintain insulation thickness at high points and roof edges shown on Drawings.
   4. Use minimum two layers of insulation.

C. Lay insulating units with close joints, in regular courses and with end joints staggered.
   1. Stagger joints between layers minimum 150 mm (6 inches).

D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.

E. Seal cut edges at penetrations and at edges against blocking with bitumen or roof cement.

F. Cut to fit tightly against blocking or penetrations.

G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.

H. Installation Method:
   1. Mechanically Fastened and Adhered Insulation:
      a. Fasten first layer of insulation in accordance with FM Approval's "RoofNav" requirement in Division 07 roofing section.
      b. Fasten first layer of insulation to resist uplift pressures specified in Division 07 roofing section.
      c. Set each subsequent layer of insulation firmly in ribbons of bead-applied insulation adhesive or in uniform application of full-spread insulation adhesive.

3.7 COVER BOARD INSTALLATION

A. Install cover boards over insulation with long joints in continuous straight lines with staggered end joints.

B. Offset cover board joints from insulation joints 150 mm (6 inches), minimum.

C. Secure cover boards firmly in ribbons of bead-applied insulation adhesive or in uniform application of full-spread insulation adhesive.

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SECTION 07 27 26
FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR PERMEABLE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fluid-applied vapor-permeable air barrier at exterior above grade wall assemblies.
   2. Connection to adjacent air barrier components in the building addition, providing a durable, continuous air barrier across the building addition.

1.2 RELATED REQUIREMENTS

A. General Quality Assurance and Quality Control Requirements: Section 01 45 29 TESTING LABORATORY SERVICES.
B. Commissioning of building envelope components: Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
C. Membrane Base Flashings Requiring Air Barrier TransitionsSection 07 54 19 POLYVINYL-CHLORIDE ROOFING
D. Metal Flashing Requiring Air Barrier Transitions: Section 07 60 00 FLASHING AND SHEET METAL.
E. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
F. Exterior Wall Openings Requiring Air Barrier Transitions: Division 08 sections for aluminum-framed entrances and storefronts, aluminum windows, louvers, and vents.
G. Wall Sheathings Air Barrier Substrates: Section 09 29 00 GYPSUM BOARD.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. Air Barrier Association of America (ABAA):
   1. Quality Assurance Program.
C. ASTM International (ASTM):
   1. C920-14a - Elastomeric Joint Sealants.
   2. C1193-13 - Use of Joint Sealants.
   3. D412-06a(2013) - Vulcanized Rubber and Thermoplastic Elastomers-Tension.
   4. E96/E96M-15 - Water Vapor Transmission of Materials.

5. E2178-13 - Air Permeance of Building Materials.
6. E2357-11 - Determining Air Leakage of Air Barrier Assemblies.

1.4 SUBMITTALS

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.
C. Test reports:
   1. Submit field inspection and test reports.
D. Certificates: Certify each product complies with specifications.
   1. Compatibility: Certify products are compatible with adjacent materials.
E. Qualifications: Substantiate qualifications comply with specifications.
   1. Manufacturer with project experience list.
   2. Installer with project experience list.
      a. Include personnel qualifications.
      b. Field supervisor qualifications.
      c. Certify installer approval by air barrier manufacturer.
F. Installation Audit:
   1. Submit audit report.

1.5 QUALITY ASSURANCE

A. Coordinate work with adjacent and related work to provide continuous, unbroken, durable air barrier system.
B. Manufacturer Qualifications:
   1. Regularly and presently manufacturing specified products.
   2. Manufacturing specified products with satisfactory service on five similar installations for minimum five years.
   3. Accreditation by ABAA.
C. Installer Qualifications:
   1. Regularly and presently installing specified products.
   2. Approved by manufacturer.
   3. Accredited by ABAA.
   4. Applicators certified according to ABAA Quality Assurance Program.

5. Applicators trained and certified by manufacturer of air barrier system.
6. Full-time on-site field supervisor shall have completed three projects of similar scope within last year.
7. Field Supervisor: Holding Sealant, Waterproofing, and Restoration Institute (SWRI) Wall Coating Validation Program Certificate, or similar qualification acceptable to Contracting Officer’s Representative (COR).
8. Field supervisor shall be accredited by ABAA as Level 3 Accredited Installer.

D. Testing Agency Qualifications:
1. Accredited by International Accreditation Service, Inc. or American Association for Laboratory Accreditation.
2. Certified to perform ABAA Quality Assurance Program installer audits.
3. Staff shall be experienced in installation of specified system and qualified to perform observation and inspection specified and determine compliance with Project requirements.

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. Work Area Ambient Temperature Range: 4 to 32 degrees C (40 to 90 degrees F) continuously, beginning 48 hours before installation.
2. Surface Requirements: Visibly dry and complying with manufacturer's instructions.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Air-Barrier Assembly Air Leakage: Maximum 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure when tested according to ASTM E2357.

B. Provide full system of compatible materials under conditions of service and application required. Compatibility based on testing by material manufacturer.

C. Perform as continuous vapor permeable air barrier and moisture drainage plane.

D. Transition to adjacent flashings and discharge water to building exterior.

E. Accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

2.2 PRODUCTS - GENERAL

A. Provide air barrier system components from one manufacturer.

B. Sustainable Construction Requirements:

1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:

a. Non-Flooring Adhesives and Sealants.

2.3 AIR BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier:

1. Elastomeric, modified bituminous or synthetic polymer membrane.
2. Air Permeance: ASTM E2178: 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure.
3. Vapor Permeance: ASTM E96/E96M: Minimum 580 ng/Pa/s/sq. m (10 perms).
4. Elongation: Ultimate, ASTM D412, Die C: 200 percent, minimum.

5. Thickness: Minimum 1.0 mm (40 mils) dry film thickness, applied in single continuous coat.
6. Surface Burning Characteristics: When tested according to ASTM E84.
   a. Flame Spread Rating: 25 maximum.
   b. Smoke Developed Rating: 450 maximum.

2.4 ACCESSORIES

A. Primer: Waterborne primer complying with VOC requirements, recommended by air barrier manufacturer to suit application.
B. Counterflashing Sheet: Modified bituminous, minimum 1.0 mm (40 mils) thick, self-adhering composite sheet consisting of minimum 0.8 mm (33 mils) of rubberized asphalt laminated to polyethylene film.
C. Substrate Patching Material: Manufacturer's standard trowel-grade filler material.
D. Sprayed Polyurethane Foam Sealant: Foamed-in-place, 24 to 32 kg/cu. m (1.5 to 2.0 pcf) density, with maximum flame-spread index of 25 when tested according to ASTM E84.
E. Flexible Opening Transition: Cured low-modulus silicone extrusion with reinforcing ribs, sized to fit opening widths, designed for adhesion to or insertion into aluminum framing extrusions, and compatible with air barrier system materials and accessories.
F. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, approved by membrane air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.

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. Correct substrate deficiencies:
   1. Remove projections and excess materials and fill voids with substrate patching material.
   2. Remove contaminants capable of affecting subsequently installed product's performance.

D. Prepare and treat substrate joints and cracks according to ASTM C1193 and membrane air barrier manufacturer's instructions.

3.2 INSTALLATION - AIR BARRIER

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 air barrier components according to requirements of ABAA Quality Assurance Program.
C. Apply primer.
D. Install transition strips and accessory materials.
E. Seal air barrier to adjacent components of building air barrier system.
F. Install flexible opening transition at each opening perimeter. Extend transition onto each substrate minimum 75 mm (3 inches).
   1. Fill gaps at perimeter of openings with foam sealant.
G. At penetrations, seal transition strips around penetrating objects with termination mastic.
   1. Fill gaps at perimeter of penetrations with sprayed polyurethane foam sealant.
H. At top of through-wall flashings, seal with continuous transition strip of manufacturer's recommended material to suit application.
I. Apply air barrier in full contact with substrate to produce continuous seal with transitions.
J. Apply fluid membrane in thickness recommended by manufacturer, and minimum specified thickness.
K. Leave air barrier exposed until tested and inspected and approved by Contracting Officer’s Representative (COR).

3.3 FIELD QUALITY CONTROL

A. Field Inspections and Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
   1. Perform inspections and tests before concealing air barrier with subsequent work.
B. Inspections:
   1. Compatibility of materials within air barrier system and adjacent materials.

2. Suitability of substrate and support for air barrier.
3. Suitability of conditions under which air barrier is applied.
4. Adequacy of substrate priming.
5. Application and treatment of joints and edges of transition strips, flexible opening transitions, and accessory materials.
6. Continuity and gap-free installation of air barrier, transition strips, and accessory materials.

C. Inspection and Test Frequency: Determined by installed air barrier surface area.
1. Up to 900 sq. m (10,000 sq. ft.): One inspection.
2. 901 - 3,300 sq. m (10,001 - 35,000 sq. ft.): Two inspections.
3. 3,300 - 7,000 sq. m (35,001 - 75,000 sq. ft.): Three inspections.
4. 7,001 - 11,600 sq. m (75,001 - 125,000 sq. ft.): Four inspections.
5. 11,601 - 19,000 sq. m (125,001 - 200,000 sq. ft.): Five inspections.
6. Over 19,000 sq. m (200,000 sq. ft.): Six inspections.

D. Submit inspection and test reports to Contracting Officer’s Representative (COR) within seven calendar days of completing inspection and test.

E. Audit:
1. Provide installer and site inspections audit by ABAA.
2. Coordinate scheduling of work and associated audit inspections.
3. Cooperate with ABAA’s testing agency. Allow access to work and staging areas.
4. Notify ABAA in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

F. Defective Work:
1. Correct deficiencies, make necessary repairs, and retest as required to demonstrate compliance with specified requirements.

3.4 CLEANING

A. Remove masking materials.

B. Clean spills and overspray using cleaning agents recommended by manufacturers of affected construction.

3.5 PROTECTION

A. Protect air barrier from construction operations.

B. Protect air barrier from exposure to UV light exposure exceeding manufacturer's recommendation.
C. Replace overexposed materials and retest.

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SECTION 07 40 00
ROOFING AND SIDING PANELS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies insulated metal wall panels as shown on Contract Documents.

1.2 RELATED WORK:

A. Sealant: Section 07 92 00, JOINT SEALANTS.

B. Insulating glass units in integral fixed windows: Section 08 80 00, GLAZING.

C. Profile and color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

A. Manufacturer’s Qualifications: Provide metal wall panels that are products of a manufacturer regularly engaged for not less than five (5) years in the fabrication of metal panels of the type and design indicated.

B. Installer: A firm with three (3) years of successful experience with installation of siding panels of type and scope equivalent to Work of this Section. Submit installer qualifications.

1.4 FIRE RATING (NOT USED)

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples: Metal panel, 152 mm (6 inch) square, showing finish, each color and texture.

C. Shop Drawings: Wall panels, showing details of construction and installation. Collateral steel framing, thickness, and kind of material, closures, fastenings, and related components and accessories. Show interfaces and relationships to work at other trades and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Manufacturer's Literature and Data: Wall panels.

E. Manufacturer’s Certificates: Indicating manufacturer’s qualifications specified.

F. Installer qualifications.

G. Manufacturer warranty.

1.6 QUALITY ASSURANCE:

A. Approval by Contracting Officer Representative (COR) is required of products of proposed manufacturer.

B. Certify manufacturer has five (5) years continuous documented experience in fabrication of metal siding panels.

C. Source: For each material type required for work of this Section, provide primary materials, which are products of one manufacturer. Provide secondary or accessory materials, which are acceptable to manufacturers of primary materials.

D. Installer: A firm with a minimum of three (3) years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.

1.7 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their metal wall panels for a minimum of ten (10) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

C. Warranty on Panel Finishes: Manufacturer's shall warrant their wall panel finish and provide standard agreement to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.

b. Chalking in excess of a No. 8 rating when testing according to ASTM D4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of installation and final acceptance by the COR.

1.8 APPLICABLE PUBLICATIONS:

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

B. American Architecture Manufacturers Association (AAMA):
2605-13..... Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

C. American Iron and Steel Institute (AISI):
SG03-02..... Cold-Formed Steel Design Manual

D. ASTM International (ASTM):
A653/A653M-13..... Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
A924/A924M-14..... Steel Sheet, Metallic Coated by the Hot-Dip Process
A1008/A1008M-10..... Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
D2244-14..... Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
D4214-07..... Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
E1592-10..... Terminology Relating to Occupational Health and Safety

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS ROOF PANELS (NOT USED)

2.2 PERFORMANCE REQUIREMENTS FOR WALL PANELS:

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592.
1. Wind Loads: See Structural Drawings.
2. Other Design Loads: See Structural Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Air Infiltration: Air leakage of not more than 0.3 L/s per sq. m (0.06 cfm/sq. ft.) when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 75 Pa (1.57 lbf/sq. ft.).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
   1. Test-Pressure Difference: 137 Pa (2.86 lbf/sq. ft.).
D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joints sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 67 degrees C (120 degrees F), ambient; 100 degrees C (180 degrees F), material surfaces.

2.3 SHEET STEEL (NOT USED)

2.4 ALUMINUM PLATE AND SHEET:

A. ASTM B209M (B209).

2.5 FASTENERS:

B. Fasteners for Aluminum Panels to be aluminum or stainless steel.
B. Fasteners of size, type, and holding strength as recommended by panel manufacturer.

2.6 GYPSUM BACKING BOARD (NOT USED)

2.7 THERMAL INSULATING MATERIALS

A. Urethane or Isocyanurate Board: ASTM C591, Type I.

2.8 FABRICATION:

A. General:
   1. Furnish panels in one continuous length for full height with no horizontal joints, except at cut-outs or openings as required for the passage of pipes, conduits, vents, and the like.
   2. Construct panels by pressing members together to form a structural unit with closed ends.
   3. Overall thickness of panels is shown of the Contract Documents.
   4. Provide connection between panels by interlocking joints filled with sealant. Seal joints between related components as required to make the work water-tight. Refer to Section 07 92 00, JOINT SEALANTS for sealing compounds.
   5. Provide collateral steel framing, metal closures, fastenings, flashing, clip, caulking, and related components and accessories.

a. Sub-girts: 1.0 mm (0.0396 inches) thick galvanized steel hat channels deigned to receive panel fasteners or clips.
b. Accessories, fastenings, and flashings to be the same material and finish as the panels. Thickness and installation of accessories and flashing to be as recommended by the panel manufacturer.

B. Insulated Metal Panels:
1. Panels to consist of a structurally reinforced insulated core, fastened between an exterior face sheet and an interior liner sheet.
2. Exterior Face Sheets:
a. 1.0 mm (0.040 inch) thick aluminum.
3. Interior Liner Face Sheet:
a. 1.0 mm (0.0396 inch) thick galvanized steel.
4. Insulation:
a. Provide foamed-in-place isocyanurate having a “U” value of 0.046 Btu/ (h x sq. ft. x degrees F).

C. Panel manufacturer shall fabricate fixed windows and frames used in conjunction with wall panels to be of same finish as exterior face sheets of wall system. Window assembly shall be “integral” with wall panels, with interlocking head and/or sill, and installed to prevent infiltration of water into structure.
1. See Section 08 80 00, GLAZING for insulating glass units.

2.9 FINISH:

A. For insulated wall panels, provide finishes as follows for face sheets. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

B. Provide aluminum alloy for color coating as required to produce specified color. Provide color as specified in Section 09 06 00, SCHEDULE FOR FINISHES. Color for sheet aluminum to not deviate more than the colors of extrusion samples.

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams, except as specified otherwise.

B. Install panels in full and firm contact with supports and with each other at side and end laps.
C. Where panels are cut in the field, or where factory-applied coverings or coatings are abraded or damaged in handling or installation, make finish repairs with material of the same type and color as the weather coating, before being installed.
D. Seal cut ends and edges, including those at openings through the sheets.
E. Correct defects or errors in the materials in a manner approved by the COR.
F. Replace defective materials which cannot be corrected with nondefective material.
G. Provide molded closure strips where indicated and whenever sheets terminate with open ends after installation.
H. Wall Panels:
   1. Apply panels with the configuration in a vertical position.
   2. Provide panels in full heights from base to eave with no horizontal joints except at the junctions of window frames.
   3. Seal side and end laps with joint sealing material.
   4. Flash and seal walls at the base, at the top, around windows and other similar openings. Install closure strips, flashings, and sealing material in an approved manner that will assure complete weather tightness.
   5. Flashing is not required where approved "self-flashing" panels are used.
I. Flashing:
   1. Provide flashing and related accessories in connection with the preformed metal panels as indicated and as necessary to provide a watertight installation.
   2. Install details of installation, which are not indicated, in accordance with the panel manufacturer's printed instruction and details, or the approved Shop Drawings.
   3. Allow for expansion and contraction of flashing.
J. Fasteners:
   1. Space fasteners in accordance with the manufacturer's recommendations, and as necessary to withstand the design loads indicated.

2. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay.
5. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.
6. Remove metal shavings and filings from roofs on completion.

3.2 ISOLATION OF ALUMINUM:

A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze, or other metal compatible with aluminum by one of the following:
   1. Painting the dissimilar metal with a prime coat of Zinc-Molybdate followed by two coats of aluminum paint.
   2. Placing a non-abrasive tape or gasket between the aluminum and the dissimilar metal.

3.3 PROTECTION AND CLEANING:

A. Protect panels and other components from damage during and after erection, and until project is accepted by the COR.
B. After completion of work, all exposed finished surfaces of panels are to be cleaned of soil, discoloration, and disfiguration. Touch-up abraded surfaces of panels.

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SECTION 07 54 19
POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Polyvinyl chloride (PVC) sheet roofing adhered to insulated concrete roof deck.

1.2 RELATED REQUIREMENTS

A. Non-Flooring Adhesives and Sealants VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
B. Vapor Retarder, Roof Insulation, and Cover Board: Section 07 22 00, ROOF AND DECK INSULATION.
C. Roof Membrane Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
   1. FX-1-01(R2006) - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
   1. 7-10 - Minimum Design Loads for Buildings and Other Structures.
D. ASTM International (ASTM):
   1. C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   2. D1876-08(2015)e1 - Peel Resistance of Adhesives (T-Peel Test).
   3. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
   4. D4434/D4434M-12 - Poly (Vinyl Chloride) Sheet Roofing.
   5. E96/E96M-15 - Water Vapor Transmission of Materials.
E. National Roofing Contractors Association (NRCA):
   1. Manual-15 - The NRCA Roofing Manual: Membrane Roofing Systems.
F. UL LLC (UL):
   1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.

2. 1897-15 - Uplift Tests for Roof Covering Systems.

G. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
1. DOC PS 1-09 - Structural Plywood.
2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.

H. U.S. Environmental Protection Agency (EPA):
1. Energy Star - ENERGY STAR Program Requirements for Roof Products Version 3.0.

1.4 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting at the Project site minimum 30 days before beginning Work of this Section.
1. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
a. Installation schedule.
b. Installation sequence.
c. Preparatory work.
d. Protection before, during, and after installation.
e. Installation.
f. Terminations.
g. Transitions and connections to other work.
h. Inspecting and testing.
i. Other items affecting successful completion.
j. Pull out test of fasteners.
k. Material storage, including roof deck load limitations.
2. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
1. Roofing membrane layout.
2. Roofing membrane seaming and joint details.
3. Roof membrane penetration details.
4. Base flashing and termination details.

C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Minimum fastener pull-out resistance.
   3. Installation instructions.
   4. Warranty.
D. Sustainable Construction Submittals:
   1. Solar Reflectance Index (SRI) for roofing membrane.
   2. Low Pollutant-Emitting Materials:
      a. Show volatile organic compound types and quantities.
   3. Energy Star label for roofing membrane.
E. Samples:
   1. Roofing Membrane: 150 mm (6 inch) square.
   2. Base Flashing: 150 mm (6 inch) square.
   3. Fasteners: Each type.
   4. Roofing Membrane Seam: 300 mm (12 inches) square.
F. Certificates: Certify products comply with specifications.
   1. Fire and windstorm classification.
   2. Energy performance requirements.
G. Qualifications: Substantiate qualifications comply with specifications.
   1. Installer, including supervisors with project experience list.
   2. Manufacturer's field representative with project experience list.
H. Field quality-control reports.
I. Operation and Maintenance Data:
   1. Maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Approved by roofing system manufacturer as installer for roofing system with specified warranty.
   2. Regularly installs specified products.
   3. Installed specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.

4. Employs full-time supervisors experienced installing specified system and able to communicate with Contracting Officer's Representative and installer's personnel.

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

1.7 DELIVERY

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

1.8 STORAGE AND HANDLING

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

1.9 FIELD CONDITIONS

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

1.10 WARRANTY

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

1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

2.2 SYSTEM PERFORMANCE

A. Design roofing system meeting specified performance:
   1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
   2. Energy Performance:
      a. EPA Energy Star Listed for low-slope roof products.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide roof system components from one manufacturer.
C. Sustainable Construction Requirements:
   1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
      a. Non-flooring adhesives and sealants.

2.4 PVC ROOFING MEMBRANE

A. PVC Sheet: ASTM D4434/D4434M, Type III - fabric reinforced.
   1. Backing: With fabric backing.
   2. Thickness: 1.5 mm (60 mils).
   3. Color: See Section 09 06 00, SCHEDULE OF FINISHES (“White”).
B. Additional Properties:
   1. Water Vapor Permeance, ASTM E96/E96M: Minimum 8 ng/Pa/s/sq. m (0.14 perms) (Water Method).

2.5 MEMBRANE ACCESSORY MATERIALS

A. Flashing Sheet: Manufacturer's standard; same material, type, reinforcement, thickness, and color as roofing membrane.
B. Factory-Formed Flashings: Inside and outside corners, pipe boots, and other special flashing shapes to minimize field fabrication.

C. Splice Lap Sealant: Manufacturer's standard for exposed lap edge, matching roof membrane color.
D. Bonding Adhesive: Manufacturer's standard, water based, to suit substrates.
E. Termination Bars: Manufacturer's standard, stainless steel or aluminum, 25 mm wide by 3 mm thick (1-inch wide by 1/8-inch thick) factory-drilled for fasteners.
F. Battens: Manufacturer's standard, galvannealed or galvanized steel, 25 mm wide by 1.3 mm thick (1-inch wide by 0.05-inch thick) factory-punched for fasteners.
G. Pipe Compression Clamp:
   1. Stainless steel drawband.
   2. Worm-drive clamp device.
H. Fasteners: Manufacturer's standard coated steel with metal or plastic plates to suit application.
I. Protection Sheet: UV-resistant fabric and weight recommended by roofing manufacturer for installation under pavers.
J. Miscellaneous Accessories: Provide other accessories required by manufacturer for complete, watertight installation.

2.6 ROOF PAVERS (NOT USED)

2.7 ACCESSORIES

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify substrate suitability for product installation with roofing installer and roofing inspector present.
   1. Verify roof penetrations are complete and secured against movement.
   2. Verify roof deck is clean, dry, and in-plane ready to receive roofing system.
B. Correct unsatisfactory conditions before beginning roofing work.

3.2 PREPARATION

A. Complete roof deck construction before beginning roofing work:
   1. Install curbs, blocking, edge strips, nailers, and other components to which roofing membrane and base flashing are attached.
   2. Coordinate roofing membrane installation with flashing work and roof insulation work so insulation and flashing are installed concurrently to permit continuous roofing operations.
   3. Document installation of related materials to be concealed before installing roofing work.

B. Dry out wet substrate surfaces. Apply materials to dry substrates, only.

C. Broom clean roof decks. Remove dust, dirt, and debris.

D. Remove projections capable of damaging roofing materials.

E. Concrete Decks:
   1. Test concrete decks for moisture according to ASTM D4263 before installing roofing materials.
   2. Prime concrete decks. Keep primer back 100 mm (f4our inches) from precast concrete deck joints.
   3. Allow primer to dry before application of bitumen.

3.3 TEMPORARY PROTECTION

A. Install temporary protection at end of each day's work, when work is halted indefinitely, and when precipitation is imminent. Comply with approved temporary protection plan.

B. Install temporary cap flashing over top of base flashings where permanent flashings are not in place to protect against water intrusion into roofing system. Securely anchor in place to prevent blow off and damage by construction activities.

C. Temporarily seal exposed insulation surfaces within roofing membrane.
   1. Apply temporary seal and water cut off by extending roofing membrane beyond insulation and securely embedding edge of the roofing membrane in 6 mm (1/4 inch) thick by 50 mm (2 inches) wide strip of temporary closure sealant. Weight roofing membrane edge with sandbags, to prevent displacement; space sandbags maximum 2400 mm (8 feet) on center.

2. Direct water away from work. Provide drainage, preventing water accumulation.
3. Check daily to ensure temporary seal remains watertight. Reseal open areas and weight down.

D. Before the work resumes, cut off and discard portions of roof membrane in contact with temporary seal.
1. Cut minimum 150 mm (6 inches) back from sealed edges and surfaces.

E. Remove sandbags and store for reuse.

3.4 INSTALLATION, GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.
1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

B. Comply with NRCA Manual installation requirements.

C. Comply with UL 580 or UL 1897 for uplift resistance.

D. Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil, grease, or other substances incompatible with PVC.

3.5 ROOFING INSTALLATION

A. Install membrane perpendicular to long dimension of insulation boards.

B. Begin membrane installation at roof low point and work towards high point. Lap membrane shingled in water flow direction.

C. Position membrane free of buckles and wrinkles.

D. Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas.
1. Allow 30 minutes for membrane to relax before proceeding.
2. Lap edges and ends minimum 50 mm (2 inches).
3. Heat-weld laps. Apply pressure to develop full adhesion with minimum seam strength according to ASTM D4434/D4434M.
4. Check seams to ensure continuous adhesion and correct defects.
5. Finish seam edges beveled bead of sealant.
6. Finish seams same day as membrane is installed.
7. Anchor membrane perimeter to roof deck and parapet wall as indicated on Drawings.

E. Membrane Perimeter Anchorage:
   1. Install batten with fasteners at perimeter of each roof area, curb flashing, expansion joints and similar penetrations on top of roof membrane as indicated on drawings.
   2. Space fasteners maximum 300 mm (12 inches) on center, starting 25 mm (1 inch) from ends.
   3. When battens are cut, round corners and eliminate sharp corners.
      a. Stop batten where batten interferes with drainage. Space ends of batten 150 mm (6 inch) apart.
   4. Cover batten with 150 mm (6 inch) wide roof membrane strip; heat or solvent weld to roofing membrane and seal edges.
   5. At fascias, turn roofing membrane down over front edge of blocking or nailer. Secure roofing membrane to vertical portion of nailer with fasteners spaced maximum 150 mm (6 inches) on center.
   6. At parapet walls, intersecting building walls and curbs, secure roofing membrane to structural deck fasteners 150 mm (6 inches) on center or as shown in NRCA Manual.

F. Adhered System Installation:
   1. Apply bonding adhesive in quantities required by roofing membrane manufacturer.
   2. Fold sheet back on itself after rolling out and coat bottom side of roofing membrane and top substrate with adhesive. Do not coat the lap joint area.
   3. After adhesive has set according to adhesive manufacturer's instructions, roll roofing membrane into adhesive minimizing voids and wrinkles.
   4. Repeat for other half of sheet.
   5. Cut voids and wrinkles to lay flat. Clean and patch cut area.

3.6 FLASHING INSTALLATION

A. Install flashings on same day as roofing membrane is installed. When flashing cannot be completely installed in one day, complete installation until flashing is watertight and provide temporary covers or seals.

B. Flashing Roof Drains:

1. Install roof drain flashing according to roofing membrane manufacturer's instruction.
   a. Install metal drain flashing in asphalt roof cement, holding cement back from edge of metal flange.
   b. Do not allow roof cement to contact PVC roofing membrane.
   c. Adhere roofing membrane to metal flashing with bonding adhesive.
2. Turn metal drain flashing and roofing membrane down into drain body. Install clamping ring and strainer.

C. Installing Base Flashing and Pipe Flashing:
1. Install flashing sheet to pipes, walls and curbs to minimum 200 mm (8 inches) height above roof surfaces and extend roofing manufacturer's standard lap dimension onto roofing membranes.
   a. Adhere flashing with bonding adhesive.
   b. Form inside and outside corners of flashing sheet according to NRCA Manual.
   c. Form pipe flashing according to NRCA Manual.
   d. Lap ends roofing manufacturer's standard dimension.
   e. Weld flashing sheets together, and weld flashing sheets to roofing membranes. Finish exposed edges with lap sealant.
2. Anchor top of flashing to walls and curbs with fasteners spaced maximum 150 mm (6 inches) on center. Use surface mounted fastening strip on ducts. Use pipe clamps on pipes or other round penetrations.
3. Apply sealant to top edge of flashing.

D. Installing Building Expansion Joints:
1. Install base flashing on curbs as specified.
2. Coordinate installation with roof expansion joint system.
3. Install flexible tubing 1-1/2 times width of joint centered over joint. Cover tubing with flashing sheet adhered to base flashing and lapping base flashing roofing manufacturer's standard dimension. Finish edges of laps with lap sealant.

E. Repairs to Membrane and Flashings:
1. Remove sections of roofing membrane and flashing sheets that are creased, wrinkled, or fish-mouthed.

2. Cover removed areas, cuts and damaged areas with patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Weld patch to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

3.7 FLEXIBLE WALKWAYS

A. Walkway Pad: PVC walkway pad with slip resistant surface and molded channels on the underside for water drainage.

3.8 PAVER INSTALLATION (NOT USED)

3.9 FIELD QUALITY CONTROL

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

1. Fastener Pull Out Tests: ANSI/SPRI FX-1; one test for every 230 sq. m (2,500 sq. ft.) of deck. Perform tests for each fastener type before installing roof insulation.
   a. Test at locations selected by Contracting Officer's Representative (COR).
   b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.
   c. Test Results:
      1) Repeat tests using different fastener type or use additional fasteners achieve pull out resistance required to meet specified wind-uplift performance.
      2) Patch cementitious deck to repair areas of fastener tests holes.
2. Examine and probe roofing membrane and flashing seams in presence of Contracting Officer's Representative (COR) and Manufacturer's field representative.
3. Probe seams to detect marginal welds, voids, skips, and fish-mouths.
4. Cut 100 mm (4 inch) wide by 300 mm (12 inch) long samples through seams where directed by Contracting Officer's Representative.
5. Cut one sample for every 450 m (1500 feet) of seams.
6. Cut samples perpendicular to seams.
7. Failure of samples to pass ASTM D1876 test will be cause for rejection of work.

8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
9. Repair fish-mouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.

B. Manufacturer Services:
1. Inspect initial installation, installation in progress, and completed work.
2. Issue supplemental installation instructions necessitated by field conditions.
3. Prepare and submit inspection reports.
4. Certify completed installation complies with manufacturer's instructions and warranty requirements.

3.10 CLEANING

A. Remove excess adhesive before adhesive sets.

B. Clean exposed roofing surfaces. Remove contaminants and stains.

3.11 PROTECTION

A. Protect roofing system from traffic and construction operations.
1. Protect roofing system when used for subsequent work platform, materials storage, or staging.
2. Distribute scaffolding loads to exert maximum 50-percent roofing system materials compressive strength.

B. Loose-lay temporary insulation board overlaid with plywood or OSB.
1. Weight boards to secure against wind uplift.

C. Remove protection when directed by Contacting Officer's Representative (COR).

D. Repair damage.

- - E N D - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fasciae, and drainage specialties are specified in this Section.

1.2 RELATED WORK

A. Manufactured flashing, copings, roof edge metal, and fasciae: Section 07 71 00 ROOF SPECIALTIES.

B. Membrane base flashings: Section 07 54 19 POLYVINYL-CHLORIDE ROOFING.

C. Flashing components of factory-finished wall systems: Division 07 wall system sections.

D. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

E. Color of factory coated exterior architectural metal and anodized aluminum items: Section 09 06 00, SCHEDULE FOR FINISHES.

E. Integral flashing components of manufactured roof specialties and accessories or equipment: Section 07 71 00, ROOF SPECIALTIES, Section 07 72 00, ROOF ACCESSORIES, Division 22, PLUMBING sections, and Division 23 HVAC sections.

F. Paint materials and application: Section 09 91 00, PAINTING.

G. Flashing of Roof Drains: Section 22 14 00, FACILITY STORM DRAINAGE.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

C. American Architectural Manufacturers Association (AAMA):

AAMA 620.....Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum

D. ASTM International (ASTM):

A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

B32-08.....Solder Metal

B209-10.....Aluminum and Aluminum-Alloy Sheet and Plate

D1187-97(R2011).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

D4586-07.....Asphalt Roof Cement, Asbestos Free

E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

G. Factory Mutual (FM) Global:

1-49-16.....Loss Prevention Data Sheet: Perimeter Flashing

H. Federal Specification (Fed. Spec):

A-A-1925A.....Shield, Expansion; (Nail Anchors)

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

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

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:

1. Wind Zone 1: 1.00 to 1.44 kPa (21 to 30 lbf/sq. ft.): 2.87-kPa (60-lbf/sq. ft.) perimeter uplift force, 4.31-kPa (90-lbf/sq. ft.) corner uplift force, and 1.44-kPa (30-lbf/sq. ft.) outward force.
2. Wind Zone 2: 1.48 to 2.15 kPa (31 to 45 lbf/sq. ft.): 4.31-kPa (90-lbf/sq. ft.) perimeter uplift force, 5.74-kPa (120-lbf/sq. ft.) corner uplift force, and 2.15-kPa (45-lbf/sq. ft.) outward force.
3. Wind Zone 3: 2.20 to 4.98 kPa (46 to 104 lbf/sq. ft.): 9.96-kPa (208-lbf/sq. ft.) perimeter uplift force, 14.94-kPa (312-lbf/sq. ft.) corner uplift force, and 4.98-kPa (104-lbf/sq. ft.) outward force.

B. Wind Design Standard: Fabricate and install copings and roof-edge flashings tested per ANSI/SPRI ES-1 to resist design pressure indicated on Drawings.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: For all specified items, including:
   1. Flashings
   2. Copings
   3. Fascia-cant

C. Manufacturer's Literature and Data: For all specified items, including:
   1. Two-piece counterflashing
   2. Thru-wall flashing
   3. Fascia-cant

D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Stainless Steel: ASTM A240/A240M, Type 302B, dead soft temper.

B. Aluminum Sheet: ASTM B209, alloy 3003-H14 except alloy used for color-anodized aluminum shall be as required to produce specified color. Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14.

2.2 FLASHING ACCESSORIES

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m^2(6 lbs/100 sf).

C. Bituminous Paint: ASTM D1187, Type I.

D. Fasteners:
   1. Use stainless steel for stainless steel and aluminum alloy.
   2. Nails:
      a. Minimum diameter for aluminum nails 3 mm (0.105 inch).

b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
3. Rivets: Not less than 3 mm (1/8 inch) diameter.
4. Expansion Shields: Fed Spec A-A-1925A.

E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
F. Insect Screening: ASTM D3656, 18 by 18 regular mesh.
G. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
B. Concealed Locations (Built into Construction):
1. Stainless steel: 0.25 mm (0.010 inch) thick.
C. Exposed Locations:
1. Stainless steel: 0.4 mm (0.015 inch).
D. Thickness of aluminum is specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:
1. In general, stainless steel joints shall be locked and soldered.
2. Jointing of stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting, and soldering.
3. Joints shall conform to following requirements:
a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Soldering:
a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of stainless steel.
b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.

c. Completely remove acid and flux after soldering is completed.

B. Cleats:

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

C. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 0.6 mm (0.024 inch) thick stainless steel.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).
6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.8 mm (0.031 inch) thick stainless steel.

D. Drips:

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

E. Edges:

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

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

2.5 FINISHES

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
C. Finish exposed metal surfaces as follows, unless specified otherwise:
1. Stainless Steel: Finish No. 2B or 2D.
2. Aluminum:
a. Fluorocarbon Finish: AAMA 620, high-performance organic coating.

2.6 THROUGH-WALL FLASHINGS

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

3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.

C. For Masonry Work When Exposed Edge Forms a Receiver for Counterflashing:
1. Use same metal and thickness as counterflashing.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
3. Form exposed portion as snap lock receiver for counter flashing upper edge.

D. For Flashing at Architectural Precast Concrete Panels or Stone Panels.
1. Use plan flat sheet of stainless steel.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:
1. Use stainless steel.
2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
3. Turn up back edge as shown.
4. Form exposed portion with drip as specified or receiver.

F. Door Sill Flashing:
1. Where concealed, use 0.5 mm (0.018 inch) thick stainless steel.
2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use 0.6 mm (0.024 inch) stainless steel.
3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

2.7 BASE FLASHING

A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
1. Use stainless steel, thickness specified unless otherwise indicated.
2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use 0.5 mm (0.018 inch) stainless steel.
3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
4. Use stainless steel at pipe flashings.

B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).

C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.
D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints.
E. Pipe Flashing: (Other than engine exhaust or flue stack)
   1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
   2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
   3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
      a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
      b. Allow for loose fit around and into the pipe.
   4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
      a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
      b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. Stainless steel, unless specified otherwise.
B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
   1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
   2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
   3. Two-piece, lock in type flashing may be used in-lieu-of one piece counterflashing.
   4. Manufactured assemblies may be used.
   5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
   6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:
   1. Back edge turned up and fabricate to lock into reglet in concrete.
   2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).
D. Two-Piece Counterflashing:
   1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
   2. Counterflashing upper edge designed to snap lock into receiver.
E. Surface Mounted Counterflashing; one or two piece:
   1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
   2. One Piece: Fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
   3. Two Pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.
F. Pipe Counterflashing:
   1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
   2. Fabricate 100 mm (4 inch) over lap at end.
   3. Fabricate draw band of same metal as counter flashing. Use 0.33 mm (0.013 inch) thick stainless steel.
   4. Use stainless steel bolt on draw band tightening assembly.
   5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.
G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.9 GRAVEL STOPS (NOT USED)

2.10 BITUMEN STOPS

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

2.11 HANGING GUTTERS (NOT USED)

2.12 CONDUCTORS (DOWNSPOUTS) (NOT USED)

2.13 SPLASHPANS (NOT USED)

2.14 REGLETS

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

2.15 INSULATED EXPANSION JOINT COVERS (NOT USED)

2.16 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING

A. Flashing at penetrations through roofing shall consist of a metal collar, sheet metal flashing sleeve and hood.
B. Fabricate collar with roof flange of 1.2 mm (0.047 inch) minimum thick black iron.
   1. Fabricate inside diameter of collar 100 mm (4 inches) larger than the outside diameter of the item penetration the roofing.

2. Extend collar height from structural roof deck to not less than 350 mm (14 inches) above roof surface.
3. Fabricate collar roof flange not less than 100 mm (4 inches) wide.
4. Option: Collar may be of steel tubing 3 mm (0.125 inch) minimum wall thickness, with not less than four, 50 mm x 100 mm x 3 mm (2 inch by 4 inch by 0.125 inch) thick tabs bottom edge evenly spaced around tube in lieu of continuous roof flange. Full butt weld joints of collar.

C. Fabricate sleeve base flashing with roof flange of stainless steel.
1. Fabricate sleeve roof flange not less than 100 mm (4 inches) wide.
2. Extend sleeve around collar up to top of collar.
3. Flange bottom of sleeve out not less than 13 mm (1/24 inch) and soldered to 100 mm (4 inch) wide flange to make watertight.
4. Fabricate interior diameter 50 mm (2 inch) greater than collar.

D. Fabricate hood counter flashing from same material and thickness as sleeve.
1. Fabricate the same as pipe counter flashing except allow not less than 100 mm (4 inch) lap below top of sleeve and to form vent space minimum of 100 mm (4 inch) wide.
2. Hem bottom edge of hood 13 mm (1/2 inch).
3. Provide a 50 mm (2 inch) deep drawband.

E. Fabricate insect screen closure between sleeve and hood. Secure screen to sleeve with sheet metal screws.

2.17 SCUPPERS (NOT USED)

2.18 GOOSENECK ROOF VENTILATORS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.

3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
7. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
8. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
9. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
10. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
11. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
12. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
13. Isolate aluminum in contact with dissimilar metals others than stainless steel or other metal compatible with aluminum by:
    a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
    b. Paint dissimilar metal with a coat of bituminous paint.

c. Apply an approved caulking material between aluminum and dissimilar metal.

14. Paint aluminum in contact with or built into mortar or other masonry materials with a coat of bituminous paint.
15. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
16. Bitumen Stops:
    a. Install bitumen stops for built-up roof opening penetrations through deck
    b. Nail leg of bitumen stop at 300 mm (12 inch) intervals to nailing strip at roof edge before roofing material is installed.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches)and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two-piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
8. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
9. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.

10. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
11. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
12. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
13. Continue flashing around columns:
    a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
    b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.

C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).

D. Flashing at Veneer Walls:
    1. Install near line of finish floors over shelf angles or where shown.
    2. Turn up against sheathing.
    3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
    4. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.

E. Lintel Flashing when not part of shelf angle flashing:
    1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
    2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
    3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

F. Window Sill Flashing:

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

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

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.
1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in

joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. General:
   1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
   2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
   3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
   4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
   5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
   6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One-Piece Counterflashing:
   1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
   2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
   3. Where flashing is surface mounted on flat surfaces.
      a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
         1) Locate fasteners in masonry mortar joints.
         2) Use screws to sheet metal or wood.
      b. Fill joint at top with sealant.
   4. Where flashing or hood is mounted on pipe.
      a. Secure with draw band tight against pipe.

b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.

c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:

1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.

2. Surface applied type receiver:

a. Secure to face construction in accordance, with manufacturer’s instructions.

b. Completely fill space at the top edge of receiver with sealant.

3. Insert counterflashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.

D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

E. When counterflashing is a component of other flashing install as shown.

3.5 REGLETS

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

B. Locate reglets not less than 225 mm (9 inch) nor more than 400 mm (16 inch) above roofing, and not less than 125 mm (5 inch) nor more than 325 mm (13 inch) above cant strip.

C. Butt and align end joints or each section of reglet and securely hold in position until concrete or mortar are hardened:

1. Coordinate reglets for anchorage into concrete with formwork construction.

2. Coordinate reglets for masonry to locate horizontally into mortar joints.

3.6 GRAVEL STOPS (NOT USED)

3.7 COPINGS

A. General:

1. On walls topped with a wood plank, install a continuous edge strip on the front and rear edge of the plank. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.

2. Where shown, turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
3. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.

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

3.8 EXPANSION JOINT COVERS, INSULATED (NOT USED)

3.9 ENGINE EXHAUST PIPE OR STACK FLASHING

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

3.10 HANGING GUTTERS (NOT USED)

3.11 CONDUCTORS (DOWNSPOUTS) (NOT USED)

3.12 SPLASH PANS (NOT USED)

3.13 GOOSENECK ROOF VENTILATORS (NOT USED)

- - - E N D - - -

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies copingsand expansion joints.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Color and Texture of Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Sealant Material and Installation: Section 07 92 00, JOINT SEALANTS.

D. General Insulation: Section 07 21 13, THERMAL INSULATION.

E. Rigid Insulations for Roofing: Section 07 22 00, ROOF AND DECK INSULATION.

1.3 QUALITY CONTROL:

A. Provide roof accessories that products of manufacturers regularly engaged in producing the kinds of products specified.

B. For each accessory type provide products made by the same manufacturer.

C. Assemble each accessory to the greatest extent possible before delivery to the Project site.

D. Provide each accessory with FM approval listing for class specified.

1.4 PERFORMANCE REQUIREMENTS:

A. Provide roof accessories that withstand exposure to weather and resist thermal movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, or installation.

B. Provide roof accessories listed in FM Approvals “RoofNav” and approved for windstorm classification Class 1-60. Identify materials with FM Approval markings.

C. Manufacture and install roof accessories to allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

1. Provide clips that resist rotation and avoid shear stress as a result of thermal movements.

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

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.

C. Samples: Representative sample panel of color-anodized aluminum not less than 101 x 101 mm (4 x 4 inches), except extrusions shall be of a width not less than section to be used. Submit sample that shows coating with integral color and texture. Include manufacturer's identifying label.

D. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

E. Manufacturer's Literature and Data: Each item specified.

F. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.6 APPLICABLE PUBLICATIONS:

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

B. ASTM International (ASTM):

A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

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

A666-10.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate

B209M-14.....Aluminum and Aluminum Alloy-Sheet and Plate (Metric)

B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

D1187/D1187M-97 (R2011).Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D1970/D1970M-14.....Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):
2605-11.....High Performance Organic Coatings on Architectural Extrusions and Panels.

E. FM Global (FM):
RoofNav.....Approved Roofing Assemblies and Products

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum, Extruded: ASTM B221M (ASTM B221).

B. Aluminum Sheet: ASTM B209M (ASTM B209).

C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.

D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

E. Recycled Content of Metal Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.

F. Asphalt Coating: ASTM D1187, Type I, quick setting.

2.2 UNDERLAYMENT:

A. Self-Adhering Modified Bitumen Underlayment:

1. Provide self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970/D1970M, suitable for use as underlayment for metal copings and fascias.
2. Provide membrane resistant to cyclical elevated temperatures for extended period of time in high heat service conditions (stable after testing at 116 degrees C (240 degrees F)).
3. Provide membrane with integral non-tacking top surface of polyethylene film or other surface material to serve as separator between bituminous material and metal products to be applied above.
4. Provide primer.

B. Slip Sheet: Provide 0.24 kg per square meter (5 pounds per 100 sf) rosin sized unsaturated building paper for slip sheet.

2.3 SOLDER (NOT USED)

2.4 COPINGS:

A. Fabricate of aluminum sheet not less than 1.6-mm (0.063 inch) thick.

B. Turn outer edges down each face of wall as shown on Construction Documents.

C. Maximum lengths of 3.05 M (10 feet).

D. Shop-fabricate external and internal corners as one-piece assemblies with not less than 305 mm (12 inch) leg lengths.

E. Provide 101 mm (4 inch) wide 0.81 mm (0.032 inch) thick watertight joint covers.

F. Provide anchor gutter bar of 0.81 mm (0.032 inch) thick with anchor holes formed for underside of joint.

G. Provide concealed guttered splice plate of 0.81 mm (0.032 inch) thick with butyl or other resilient seal strips anchored to splice plate for underside of joint. Use galvanized steel anchor plate providing compression spring anchoring of coping cover.

H. Finish: Two-coat fluoropolymer. Color: See Section 09 06 00 SCHEDULE FOR FINISHES.

2.5 EXTRUDED ALUMINUM GRAVEL STOPS AND FASCIAS (NOT USED)

2.6 EXTRUDED ALUMINUM FASCIA-CANT SYSTEM (NOT USED)

2.7 EXTRUDED ALUMINUM ROOF EXPANSION JOINT COVERS:

A. Fabricate in 3.0 M (10 foot) lengths with fastener openings slotting for expansion not over 610 mm (24-inch) centers.

B. Provide four-way expansion, for joint widths shown on construction documents.

C. Mill finish.

D. Form waterstop or moisture seals of continuous sheets of polychloroprene (chloroprene rubber (CR) or “Neoprene”), not less than 0.81 mm (0.032-inch) thick.

E. Fabricate corners as one-piece assembly with mitered and welded joint and least dimension legs not less than 300 mm (12-inches) long.

F. Factory-fabricate end caps and transitions to insure waterproof assembly.

G. Five-piece assembly:

1. Roof expansion joint cover system consists of an extruded-aluminum cover, extruded frame or curb vertical section, galvanized steel cant, and aluminum compression clamp counter flashing, complete with

moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080-inch) minimum thickness with spring stainless steel tension or pivot bar.

2. Form cant from galvanized steel not less than 0.8 mm (0.029-inch) thick formed to profile shown on Construction Documents.
3. Form splice plates of not less than 0.81 mm (0.032-inch) thick aluminum sheet.
4. Form counter flashing member of 1.3 mm (0.050-inch) thick sheet aluminum, secured with screws to the top edge of the vertical section and providing compression clamp over base flashing.
5. Provide compression gasket separating cover from curb bearing.

H. Two-piece assembly:

1. Roof expansion joint system consists of an extruded-aluminum cover combination extruded aluminum frame or curb with integral adjustable counter flashing flange, and moisture seals.
2. Form cover from extruded aluminum 2 mm (0.078-inch) minimum thickness.
3. Form cover anchor system of stainless-steel pivot bar.
4. Form frame assembly of not less than 2 mm (0.076-inch) aluminum except for flashing portion.
5. Provide compression gasket separating cover from curb at bearing.

2.8 FINISH:

A. In accordance with NAAMM AMP 500-505.

B. Fluoropolymer Finishes: High-performance organic coating. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70-percent PVDF resin by weight in color coat.
2. Concealed Surface Finish: Apply pretreatment and manufacturer’s standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.013 mm (0.5 mil).

C. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Examine substrates, areas, and conditions, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

C. Underlayment Installation:

1. Self-Adhering Sheet Underlayment:

a. Apply primer as required by manufacturer.

b. Comply with temperature restrictions of underlayment manufacturer for installation.

c. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 152 mm (6 inches) staggered 610 mm (24 inches) between courses.

d. Overlap side edges not less than 89 mm (3-1/2 inches). Roll laps with roller.

e. Cover underlayment within 14 days.

f. Apply continuously under copings.

g. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

2. Slip Sheet:

a. Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties.

b. Apply in shingle fashion to shed water, with lapped joints of not less than 50 mm (2 inches).

D. Install roof accessories where indicated in Construction Documents.

E. Secure with fasteners in accordance with manufacture's printed installation instructions and approved Shop Drawings unless shown otherwise. Provide fasteners suitable for application, for metal types being secured, and designed to meet performance requirements.

F. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.

G. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions.

H. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.

I. Fascias:

1. Install fascia with butt joints with approximately 6 mm (1/4-inch) space for expansion.

2. Over each joint provide cover plates of sheet aluminum, complete with concealed sheet aluminum flashing, centered under each joint.
3. Provide lap cover plates and concealed flashing over the fascia not less than 101 mm (4 inches).

J. Aluminum Coping:
1. Install sections of coping with approximately 6 mm (1/4-inch) space between ends of sections.
2. Center joint gutter bar and covers at joints and lock in place.
3. When snap-on system is installed ensure front and back edges are locked in place.

K. Expansion Joint Covers:
1. Install to terminate base flashing 203 mm (8 inches) above roof.
2. Install moisture seals to drain water to outlets that do not permit water to enter building.
3. Provide stainless-steel screws when exposed.
4. Three-piece assembly:
   a. Install curb section with screws to wood blocking, allowing 6 mm (1/4 inch) at butt joints between sections with splice plate at joint.
   b. Install cant to wood blocking by nailing along horizontal flange every 152 mm (6 inches), with galvanized roofing nails 25 mm (1-inch) long.
   c. After completion of base flashing install cap flashing and compression clamp and fasten to the curb or metal cant with stainless-steel self-tapping screws with polychloroprene (chloroprene rubber (CR) or “Neoprene”) washers under head spaced approximately 457 mm (18 inches) on center.
   d. Install expansion joint cover with a 6 mm (1/4 inch) wide end joints.
   e. Install over end joint a cover plate complete with concealed aluminum flashing, centered under each joint. Fabricate flashing to lap cover not less than 101 mm (4 inches.
5. Two-piece assembly:
   a. Install curb section with screws allowing 6 mm (1/4-inch) space at end joints with splice plate at joint.
   b. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.

c. Install expansion joint cover with 6 mm (1/4-inch) wide space at end joints and tension bars at 610 mm (24 inches) on center.
d. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 101 mm (4 inches).

3.2 PROTECTION OF ALUMINUM:

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed polychloroprene (chloroprene rubber (CR) or “Neoprene”) tape having pressure-sensitive adhesive coating on one side.
B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two (2) coats of asphalt coating.

3.3 ADJUSTING:

A. Adjust expansion joints to close tightly and be watertight; insuring maximum allowance for building movement.

3.4 PROTECTION:

A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies roof hatches.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

D. General insulation: Section 07 21 13, THERMAL INSULATION.

E. Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION.

1.3 QUALITY ASSURANCE:

A. Provide roof accessories that are the products of manufacturers regularly engaged in producing the kinds of products specified.

B. For each accessory type provide the same product made by the same manufacturer.

C. Assemble each accessory to the greatest extent possible before delivery to the Project site.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Postconsumer and pre-consumer recycled content as specified in PART 2 - PRODUCTS.

C. Samples: Submit representative sample panel of color-anodized aluminum not less than 101 x 101 mm (4 x 4 inches). For extrusions, submit width not less than section to be installed. Show coating with integral color and texture and include manufacturer's identifying label.

D. Shop Drawings: Each item specified showing design, details of construction, installation, and fastenings.

E. Manufacturer's Literature and Data: Each item specified.

F. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS:

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

B. ASTM International (ASTM):

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate

B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

C1289-14a.....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

D1187/D1187M-97(R2011)..Asphalt-Base Emulsions for Use as Protective Coatings for Metal

C. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):

2603-13.....Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

E. U.S. National Archives and Records Administration (NARA):

29 CFR 1910.23.....Guarding Floor and Wall Openings and Holes

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum, Extruded: ASTM B221M (ASTM B221).

B. Aluminum Sheet: ASTM B209M (ASTM B209).

C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.

D. Recycled Content of Metal Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 30 percent.

E. Asphalt Coating: ASTM D1187/D1187M, Type I, quick setting.

2.2 ROOF HATCH (SCUTTLE):

A. Performance Characteristics:

1. Cover to be reinforced to support a minimum live load of 195 kg per sq. m (40 lb. per sq. ft.) with a maximum deflection of 1/150th of the span or 97 kg per sq. m (20 lb. per sq. ft.) wind uplift.
2. Operation of the Cover: Smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the Cover: Not affected by temperature.
4. Entire Hatch: Weathertight with fully welded corner joints on cover and curb.

B. Shop-fabricate from aluminum with mill finish.

C. Curb and Cover:
1. Exterior facing: Minimum 2.3 mm (0.09-inch) thick sheet aluminum with mill finish.
2. Interior facing: Minimum 1 mm (0.04-inch) thick sheet aluminum.
3. Minimum of 50 mm (2-inch) thick polyisocyanurate insulation (ASTM C1289) with a U-value = 0.47 W/m^2 K (R-value = 12) between facings of cover and over exterior face of curb.
4. Form exterior curb facing with an integral 76 mm (3-inch) wide roof flange and cap flashing minimum 2.3 mm (0.09-inch) thick sheet aluminum.
5. Make curb 305 mm (12 inches) above finish roof surface.
6. Form cover to lap curb and cap flashing.
7. Size of Clear Opening: 48-inches square.
8. Finish: AAMA 2603; color in white.

D. Hardware:
1. Provide spring snap latch with inside and outside operating handles and padlock hasp on inside. Provide two snap latches when hinge side is over 2100 mm (7-feet) long. Bolt hardware into heavy gauge channel reinforcement welded to the underside of the cover and concealed within the insulation space.
2. Provide heavy-duty pintle hinges.
3. Provide automatic hold open and operating arm with enclosed torsion or compression-spring lifting mechanism.
4. Latch Strike: Stamped component bolted or welded to the curb assembly.
5. Automatically lock in the open position at not less than 70 degrees.
6. Provide weatherstripping at cover closure.
7. Galvanize all hardware items.

E. Assembly:
   1. Shop-assemble roof scuttle.
   2. Weld joints exposed to the weather and built into the roofing.
   3. Finish weld smooth where exposed.
F. Safety Accessories:
   1. Ladder Assist Post: Provide a telescoping tubular section that locks automatically when fully extended. Control upward and downward movement by a stainless steel spring balancing mechanism. Provide unit completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer’s instructions.
   2. Safety Railing: Provide a fixed, attached to the roof hatch railing assembly including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; complying with 29 CFR 1910.23 requirements.

2.3 EQUIPMENT SUPPORTS (NOT USED)

2.4 LOW SILHOUETTE GRAVITY VENTILATORS (NOT USED)

2.5 METAL GRATING ROOF WALKWAY SYSTEM (NOT USED)

2.6 FINISH:

A. In accordance with NAAMM AMP 500 Series.
B. Powder-Coat Finish: AAMA 2603 except with a minimum dry-film thickness of 0.04 mm (1.5 mils). Comply with coating manufacturer’s written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install roof specialties where indicated on Construction Documents.
B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved Shop Drawings unless shown otherwise.
C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.
D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions require sealant.
E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
   1. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.

2. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 610 mm (24 inches) on center.
3. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing shall lap cover not less than 101 mm (4 inches).

3.2 PROTECTION OF ALUMINUM:

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed polychloroprene (chloroprene rubber (CR) or “Neoprene”) tape having pressure-sensitive adhesive coating on one side.

B. Paint aluminum in contact with wood, concrete, and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING:

A. Adjust roof hatch hardware to operate freely and so that cover will operate without binding, close tightly at perimeter, and latch securely.

3.4 PROTECTION:

A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies spray-applied cementitious coverings to provide fire resistance to interior structural steel members shown.

1.2 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Installer qualifications.

C. Testing laboratory accreditations.

D. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

E. 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.

F. 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 Project 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 Project 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 shall be accredited by a laboratory accreditation authority. Submit a copy of the Certificate of Accreditation and Scope of Accreditation.

C. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

D. Manufacturer's inspection and approval of surfaces to receive fireproofing.

E. Manufacturer's approval of fireproofing applications.

F. Manufacturer's approval of completed installation.

G. Manufacturer's representative shall observe and advise at the commencement of application, and shall visit the Project site as required thereafter for the purpose of ascertaining proper application.

H. Pre-Application Test Area.

1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
   a. Apply to one (1) column.
   b. Apply for the hourly ratings required in the Construction Documents.
2. Install in location selected by the COR, for approval by the representative of the fireproofing material manufacturer and the COR.
3. Perform bond test for cohesive and adhesive strength in accordance with ASTM E736 for each applied fireproofing design used.
4. Perform density test in accordance with ASTM E736 for each applied fireproofing design used.
5. Do not proceed in other areas until installation of test area has been completed and approved.
6. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

1.6 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

C841-03(R2013).....Installation of Interior Lathing and Furring

C847-14.....Metal Lath

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. Intertek Testing Services (ITS):
Certification Listings..Latest Edition

E. Factory Mutual System (FM):
Approval Guide.....Latest Edition including Supplements

PART 2 - PRODUCTS

2.1 SPRAYED-ON FIREPROOFING:

A. ASTM E1042, Class (a), Category A.
1. Type I, factory mixed cementitious materials with approved aggregate.

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.

	Characteristic	Test	Results
			19.15 kPa (400 lbf per sq. ft.) for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27 gm per sq. meter (0.025 gm per sq. ft.).

6.	Compressive Strength	ASTM E761	Minimum compressive strength 48 kPa (1000 psf).
7.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 25 or less smoke developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE (NOT USED)

2.3 SEALER (NOT USED)

2.4 WATER:

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL:

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg per square meter (1.7 pounds per square yard) or as required, according to fire-resistance designs indicated and fire proofing manufacturer’s written instructions.

B. Fasteners: ASTM C841.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

D. Reinforcing Mesh: Metallic-mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachments.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water-soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts, and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. When applied in conjunction with roof structures or roof decks, verify that roofing, installation of rooftop HVAC equipment, and other related work are complete.

F. Verify temperature and enclosure conditions required by fireproofing material manufacturer.

G. Conduct tests according to fireproofing manufacturer’s written instructions to verify that substrates are free of substances capable of interfering with bond. Submit test report.

3.2 APPLICATION:

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Cover other work and exterior openings subject to damage from fallout or overspray of fireproofing materials during application.

D. Application of Metal Lath:

1. Apply to beam and columns having painted surfaces which fail ASTM E736 bond test requirements in pre-application test area.
2. Apply to beam flanges 305 mm (12-inches) or more in width.
3. Apply to column flanges 406 mm (16-inches) or more in width.
4. Apply to beam or column web 406 mm (16-inches) or more in depth.
5. Tack-weld or mechanically fasten on maximum of 305 mm (12-inch) center.
6. Lap and tie lath member in accordance with ASTM C841.

E. Mix and apply in accordance with manufacturer's instructions.

1. Mechanically control material and water ratios.
2. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or ITS/WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
3. Minimum dry density of material applied per ASTM E605 to the underside of the walk-on deck (interstitial), hung-purlin or beam-and-steel deck, columns in interstitial spaces, and mechanical equipment rooms shall be as follows:

a. Type I - 350 kg per cubic meter (22 lb. per cubic ft.).

b. Provide materials with higher density of 640 kg per cubic metric (40 lb. per cubic feet) in mechanical equipment rooms.

F. Complete application shall be completed in one area. Inspection and approval by COR is required before removal of application equipment and proceeding with further work.

3.3 FIELD TESTS:

A. The applied fireproofing to be tested by a COR-approved independent testing laboratory and paid for by the Contractor. Submit test reports documenting results of tests on the applied material in the Project.

B. COR will select area to be tested in specific bays on each floor using a geometric grid pattern. Apply test sample every 929 square meters (10,000 square feet) of floor area or two (2) for each floor, whichever produces the greatest number of test areas.

C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test are not acceptable.

D. Areas showing less than required fireproofing characteristics for the following field tests will be rejected.

1. Test for cohesion/adhesion: ASTM E736.
2. Test for bond impact strength: ASTM E760.

3.4 PATCHING AND REPAIRING:

A. Inspect installation after mechanical, electrical, and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material manufacturer's recommendations.

1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
3. Do not hand-mix material.

C. Repair:

1. Respray test and rejected areas.
2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.6 SCHEDULE:

A. Apply fireproofing material to interior structural steel members as indicated on Drawings, except on following surfaces:

1. Steel to be encased in concrete or designated to receive other type of fireproofing.

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SECTION 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire-resistant-rated construction.

B. Provide UL or equivalent approved firestopping system for the closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

C. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

D. Sealants and application: Section 07 92 00, JOINT SEALANTS.

E. Fire and smoke damper assemblies in ductwork: Division 23, HEATING, VENTILATING, AND AIR-CONDITIONING.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Installer qualifications.

D. Inspector qualifications.

E. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

F. List of FM, UL, or WH classification number of systems installed.

G. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

H. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

1.4 DELIVERY AND STORAGE:

A. Deliver materials in their original unopened containers with manufacturer’s name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

1.5 QUALITY ASSURANCE:

A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.

C. Inspector Qualifications: Contractor shall engage a qualified inspector to perform inspections and final reports. The inspector shall meet the criteria contained in ASTM E699 for agencies involved in quality assurance and shall have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector shall be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

1.6 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

E84-14.....Surface Burning Characteristics of Building Materials

E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components

E814-13a.....Fire Tests of Through-Penetration Fire Stops

E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops

E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

C. FM Global (FM):

Annual Issue Approval Guide Building Materials

4991-13.....Approval of Firestop Contractors

D. Underwriters Laboratories, Inc. (UL):
Annual Issue Building Materials Directory
Annual Issue Fire Resistance Directory
723-10(2008).....Standard for Test for Surface Burning Characteristics of Building Materials
1479-04(R2014).....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):
Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

A. Provide either factory-built firestop devices or field-erected through-penetration firestop systems to form a specific building system maintaining required integrity of the fire barrier and to stop the passage of gases or smoke. Firestop systems shall accommodate building movements without impairing their integrity.
   1. Fire-resistance- and/or smoke-rated partitions and corridor partitions shall extend from the finished floor to where they may be sealed tight, such as the underside of the structure or deck above. Penetrations through such partitions shall be sealed per the appropriate approved, tested, and rated design assembly for the wall rating designated.
   2. In new construction or conditions requiring existing construction to be removed, all penetrations through floor slabs such as piping, conduits, ducts, pneumatic tubes, and the like, shall be sealed with an approved, tested, and rated design assembly, in accordance with the applicable details.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating shall 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 shall have the following properties:

1. Contain no flammable or toxic solvents.
2. Release no dangerous or flammable out gassing during the drying or curing of products.
3. Water-resistant after drying or curing and unaffected by high humidity, condensation, or transient water exposure.
4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
   a. Sealants: 250 g/L.
   b. Sealant Primers for Nonporous Substrates: 250 g/L.
   c. Sealant Primers for Porous Substrates: 775 g/L.

D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:
   1. Classified for use with the particular type of penetrating material used.
   2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.

E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material shall 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 shall be nontoxic and non-carcinogenic at all stages of application or during fire conditions and shall not contain hazardous chemicals. Provide firestop material that is free from ethylene-glycol, polychlorinated-biphenyl (PCB), methyl-ethyl-ketone (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.) 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.

I. Provide approved, tested, and rated putty pads on the back of all steel wall boxes located closer than 24 inches on center to each other in rated walls. See G-Series Drawings for accepted assemblies. Install per manufacturer's instructions.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS:

A. In fully sprinklered group I-2 occupancies, the corridor partitions shall be made to resist the passage of smoke, or be 'smoke tight'. These partitions shall extend from the finished floor to where they may be sealed tight, such as the underside of the structure or deck above. Partitions and any penetrations shall be sealed tight with drywall compound or sealant.

B. Provide silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.

C. Provide mineral fiber filler and bond breaker behind sealant.

D. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with ASTM E84.

E. 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 Part-1 article entitled “Submittals,” after an on-site examination of areas to receive firestopping.

B. Existing fire rated walls and smoke tight walls within the limits of construction shall be inspected to ensure the following:

1. Partition shall extend and be tight to and sealed off from the bottom and to the deck or structure above.

2. Penetrations and holes through walls shall be repaired/patched in accordance with the applicable details.

C. In general, existing rated walls are assumed to extend to the underside of the deck or structure, and when discovered not to be doing so, shall be extended as follows:

1. At Non-Load-Bearing Concrete Masonry Units (CMUs): Walls having 4-inch-thick solid masonry or 8-inch-thick CMU (D-2) at one- or two-hour fire-resistance-rated wall shall be extended up to within 2 inches below the structure above, and shall be filled at the top with a UL-rated assembly for the hourly rating required.
2. At One-Hour Fire-Resistance-Rated Plaster/Drywall Partitions: use 4-inch-deep metal studs with 5/8-inch-thick fire-resistance-rated gypsum board at each side.
3. At Two-Hour Fire-Resistance-Rated Plaster/Drywall Partitions: Use 4-inch-deep metal studs with two layers of 5/8-inch-thick rated gypsum board at each side.
4. Upon completion of the fire-resistance- or smoke-rated wall upgrade, patch and repair and install new wall, floor, and ceiling finishes as required.

D. 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-resistance-rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer’s recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.

B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

1. See standard fire-resistance-rated/smoke wall and penetration details sheet included on the Drawings.
2. Devices contained in metallic boxes in fire-resistance-rated wall openings of two hours or less, not exceeding 16 square inches, are permitted provided the area of such openings does not aggregate more than 100 square inches for any 100 square feet of fire-resistant wall area. The gypsum board face shall be cut closely to the box so that the clearance from the box does not exceed 1/8 inch. Boxes on opposite sides of the fire-resistance-rated wall shall be separated by a horizontal distance of not less than 24 inches, or be completely covered with putty pads per the approved, tested, and rated design assembly.

C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP:

A. As work on each floor is completed, remove materials, litter, and debris.

B. Clean up spills of liquid-type materials.

C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection,

damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).

B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and type of firestopping used at each location; identify type using UL-listed printed numbers.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Sealing of Site Work Concrete Paving: Division 32, EXTERIOR IMPROVEMENTS.

C. Masonry Control and Expansion Joint: Section 04 20 00, UNIT MASONRY.

D. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

E. Glazing: Section 08 80 00, GLAZING.

F. Sound Rated Gypsum Partitions/Sound Sealants: Section 09 29 00, GYPSUM BOARD.

G. Mechanical Work: Division 21, FIRE SUPPRESSION, Division 22, PLUMBING, and Division 23, HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC).

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: An experienced installer with a minimum of three (3) years’ experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.

B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Lab Tests: Submit samples of materials that will be in contact or affect joint sealants to joint sealant manufacturers for tests as follows:
   1. Adhesion Testing: Before installing elastomeric sealants, test their adhesion to 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.

E. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
   1. Conduct field tests for each application indicated below:
      a. Each type of elastomeric sealant and joint substrate indicated.
      b. Each type of non-elastomeric sealant and joint substrate indicated.

F. Mock-Ups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections and to demonstrate aesthetic effects and qualities of materials and execution:
   1. Joints in Mock-Ups of assemblies that are indicated to receive elastomeric joint sealants.

1.4 CERTIFICATION:

A. Contractor shall 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).

SWRI STPG-13 ..... Sealants: 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. S-1 Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
2. S-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.
   d. Cast stone to cast stone.
   e. Masonry expansion and control joints.
   f. Voids where items penetrate exterior walls.
   g. Metal reglets, where flashing is inserted into masonry joints.

B. Floor Joint Sealant:

1. S-3Provide 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. S-4 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.

3. 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, and access panels which adjoin 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. Perimeter of gypsum wallboard walls.

f. Exposed isolation joints at top of full-height walls.

g. Joints formed where nonplanar tile surfaces meet.

h. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.

i. Behind escutcheon plates at valve pipe penetrations and showerheads in showers.

D. Acoustical Sealant:

1. Conforming to ASTM C919; flame spread index of 25 or less; and a smoke developed index of 50 or less when tested in accordance with ASTM E84. Acoustical sealant shall 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 shall match color of mortar joints.

B. Sealants used with unpainted concrete shall match color of adjacent concrete.

C. Color of sealants for other locations shall 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: Polychloroprene (chloroprene rubber (CR) or “Neoprene”), butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 WEEPS:

A. Weep/Vent Products: Provide the following unless otherwise indicated or approved.

1. Round Plastic Tubing: Medium-density polyethylene, 10 mm (3/8-inch) OD by thickness of masonry veneer.

2.5 FILLER:

A. Mineral fiberboard: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.7 CLEANERS-NON POROUS SURFACES:

A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners shall 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 STPG.

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 one-half of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately one-half of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in Construction Documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to “skin” over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean, finished condition.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
11. Replace sealant which is damaged during construction process.

B. Weeps: Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, at all flashing, and as indicated on Construction Documents.

1. Use round plastic tubing to form weep holes.
2. Space weep holes formed from plastic tubing not more than 406 mm (16 inches) o.c.
3. Trim tubing material used in weep holes flush with exterior wall face after sealant has set.

C. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

D. Interior Sealants: Where gypsum board partitions are of sound-rated, fire-rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
   1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
   2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
   3. Partition Intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
   4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes, and similar penetrations. To seal electrical boxes, seal sides and backs.
   5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
   1. Extent of Testing: Test completed elastomeric sealant joints as follows:
      a. Perform 10 tests for first 305 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
      b. Perform one test for each 305 m (1000 feet) of joint length thereafter or one test per each floor per elevation.

B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

C. Inspect tested joints and report on following:
   1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.

2. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
3. Whether sealants filled joint cavities and are free from voids.
4. Whether sealant dimensions and configurations comply with specified requirements.

D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.7 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.

B. Leave adjacent surfaces in a clean and unstained condition.

- - - E N D - - -

SECTION 08 06 71
DOOR HARDWARE SCHEDULE

The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. YA - Yale
5. BE - dormakaba Best
6. HS - HES
7. RF - Rixson
8. NO - Norton
9. SU - Securitron
10. OT - OTHER

Hardware Sets

Set: 1.0

Doors: 6080

1	Continuous Hinge (A31031G)	HT CFM (height)HD1		PE
1	Exit Device (Type 1, 01)	6100 EO	630YMS	YA
1	Surface Closer (C02021-Spg Stop)	3531 M	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (J36130)	273x224AFGT		PE
1	Adhesive Gasketing (R0Y154)	S773BL		PE
1	Rain Guard (R0Y976)	346C		PE
1	Sweep (R0Y416)	18061CNB		PE
1	Position Switch (E08)	DPS-M-BK		SU

Set: 2.0

Doors: 6004, 6032, 6056

2	Continuous Hinge (A31031G)	HT CFM(height) SLF-HD1		PE
1	Flush Bolt (Type 27)	2805	US26D	RO
1	Passage Set (F01)	AUR 8801FL	626YMS	YA
2	Door Stop (L02101)	401	US26D	RO

Notes:
• Perimeter/meeting stile seals by frame/door supplier.

Set: 3.0

Doors: 6057

2	Continuous Hinge (A31031G)	HT CFM (height) HD1 PT		PE	
1	Exit Device (Type 7, 01, E01, E04)	6170F LBR B P EO	630YMS	YA	
1	Exit Device (Type 7, 03, E01, E04)	6170F LBR B P AU627F	630YMS	YA	⚡
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
2	Door Operator	6020 D	689	NO	⚡
2	Armor Plate (J101)	K1050 F 35" CSK	US32D	RO	
2	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
2	Astragal (R0Y834)	18041CNB		PE	
2	Electric Power Transfer	EL-CEPT		SU	⚡
2	Frame Harness	QC-C1500P		MK	⚡
2	Door Harness	QC-C___		MK	⚡
2	Position Switch (E08)	DPS-M-BK		SU	⚡
2	Wave To Open Switch	700		NO	⚡
1	Remote Release Push Button	PB3ER		SU	⚡
1	Controller	782		YA	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader, intercom by security integrator.
• Electronic Operation: Outside, Card reader, remote release push button signals power supply to retract exit device latch allowing entry by door pull or automatic operator by wall switch. Key override. Inside, Free egress at all times by exit device or automatic operator by wall switch. In case of power loss, door remains locked and latched.

Set: 4.0

Doors: 6083

2	Continuous Hinge (A31031G)	HT CFM (height) HD1 PT		PE	
1	Exit Device (Type 7, 01, E01, E04)	6170F LBR B P EO	630YMS	YA	
1	Exit Device (Type 7, 03, E01, E04)	6170F LBR B P AU627F	630YMS	YA	⚡
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
2	Door Operator	6020 D	689	NO	⚡
2	Armor Plate (J101)	K1050 F 35" CSK	US32D	RO	
2	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
2	Astragal (R0Y834)	18041CNB		PE	
2	Electric Power Transfer	EL-CEPT		SU	⚡
2	Frame Harness	QC-C1500P		MK	⚡
2	Door Harness	QC-C___		MK	⚡
2	Position Switch (E08)	DPS-M-BK		SU	⚡
2	Wave To Open Switch	700		NO	⚡
1	Controller	782		YA	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader, intercom by security integrator.
• Electronic Operation: Outside, Card reader, signals power supply to retract exit device latch allowing entry by door pull or automatic operator by wall switch. Key override. Inside, Free egress at all times by exit device or automatic operator by wall switch. In case of power loss, door remains locked and latched.

Set: 5.0

Doors: 6079

3	Hinge (A8111))	H T4A3786	US26D	MK	
1	Exit Device (Type 1, E01, E05)	6100F B AU690F	630YMS	YA	⚡
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA	
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO	
1	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
1	Electric Power Transfer	EL-CEPT		SU	⚡
1	Frame Harness	QC-C1500P		MK	⚡
1	Door Harness	QC-C___		MK	⚡
1	Position Switch (E08)	DPS-M-BK		SU	⚡
1	Power Supply	BPS-24-1		SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader by security integrator.
• Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss or fire alarm, door remains unlocked and latched.

Set: 6.0

Doors: 6084, 6085

2	Continuous Hinge (A31031G)	HT CFM (height) HD1 PT		PE	
2	Exit Device (Type 7, 01, E04)	6170F P EO	630YMS	YA	⚡
2	Door Operator	6050	689	NO	⚡
4	Armor Plate (J101)	K1050 F 35" CSK	US32D	RO	
2	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
2	Astragal (R0Y834)	18041CNB		PE	
2	Electric Power Transfer	EL-CEPT		SU	⚡
2	Frame Harness	QC-C1500P		MK	⚡
2	Door Harness	QC-C___		MK	⚡
2	Wave To Open Switch	700		NO	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Electronic operation: Automatic operator by wall switch.

Set: 7.0

Doors: 6082

3	Hinge (A8112)	H TA2714	US26D	MK
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02101)	401	US26D	RO
3	Silencer (L03011)	608		RO

Set: 8.0

Doors: 6051

3	Hinge (A8112)	H TA2714	US26D	MK
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02101)	401	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 9.0

Doors: 6039, 6040

3	Hinge (A8112)	H TA2714	US26D	MK
1	Office Lock (F04)	AUR 8807FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Door Stop (L02101)	401	US26D	RO
3	Silencer (L03011)	608		RO
1	Coat Hook (L03111)	806	US26D	RO

Set: 10.0

Doors: 6015

3	Hinge (A8112)	H TA2714	US26D	MK
1	Classroom Lock (F05)	AUR 8808FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surf Overhead Stop (CO2541)	9-X36	630	RF
3	Silencer (L03011)	608		RO

Set: 11.0

Doors: 6025

3	Hinge (A8112)	H TA2714	US26D	MK
1	Classroom Lock (F05)	AUR 8808FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02101)	401	US26D	RO
3	Silencer (L03011)	608		RO

Set: 12.0

Doors: 6035A

3	Hinge (A8112)	H TA2714	US26D	MK
1	Classroom Lock (F05)	AUR 8808FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02101)	401	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 13.0

Doors: 0006

3	Hinge (A8112)	H TA2714	US26D	MK
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02101)	401	US26D	RO
3	Silencer (L03011)	608		RO

Set: 14.0

Doors: 6030, 6043, 6044, 6045, 6064, 6065, 6066, 6067, 6068, 6069, 6070, 6071, 6072, 6073, 6074, 6075, 6076, 6077

3	Hinge (A8112)	H TA2714	US26D	MK
1	Privacy Lock (F19)	AUR 8802FL IND	626YMS	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
1	Hinge Pin Stop	76306	US26D	MK
3	Silencer (L03011)	608		RO

Set: 15.0

Doors: 6081

6	Hinge (A8111))	H T4A3786	US26D	MK	
2	Flush Bolt (L04251 / L04261)	555	US26D	RO	
1	Dust Proof Strike (L04021)	570	US26D	RO	
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA	
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
1	SMART Pac Bridge Rectifier	2005M3		HS	⚡
1	Electric Strike (E09381)	1600	630	HS	⚡
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA	
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO	
2	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
1	Astragal (R0Y634)	357C		PE	
1	Electric Power Transfer	CEPT-NW		SU	⚡
2	Position Switch (E08)	DPS-M-BK		SU	⚡
1	Request To Exit Sensor	XMS		SU	⚡
1	Power Supply	BPS-24-1		SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader by security integrator.
• Electronic Operation: Valid card releases electric strike or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss, door remains locked and latched.

Set: 16.0

Doors: 6016B, 6017, 6018, 6021, 6035B, 6041, 6054

3	Hinge (A8111))	H T4A3786	US26D	MK	
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA	
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
1	SMART Pac Bridge Rectifier	2005M3		HS	⚡
1	Electric Strike (E09381)	1600	630	HS	⚡
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA	
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO	
1	Door Stop (L02101)	401	US26D	RO	
3	Silencer (L03011)	608		RO	
1	Position Switch (E08)	DPS-M-BK		SU	⚡
1	Request To Exit Sensor	XMS		SU	⚡
1	Power Supply	BPS-24-1		SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader by security integrator.
• Electronic Operation: Valid card releases electric strike or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss, door remains locked and latched.

Set: 17.0

Doors: 6016A, 6022A, 6022B, 6028, 6055A, 6055B

3	Hinge (A8111))	H T4A3786	US26D	MK	
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626YMS	YA	
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
1	SMART Pac Bridge Rectifier	2005M3		HS	⚡
1	Electric Strike (E09381)	1600	630	HS	⚡
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA	
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO	
1	Door Stop (L02101)	401	US26D	RO	
1	Adhesive Gasketing (R0Y154)	S88BL		PE	
1	Position Switch (E08)	DPS-M-BK		SU	⚡
1	Request To Exit Sensor	XMS		SU	⚡
1	Power Supply	BPS-24-1		SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader by security integrator.
• Electronic Operation: Valid card releases electric strike or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss, door remains locked and latched.

Set: 18.0

Doors: 6023, 6031

3	Hinge (A8111))	H T4A3786	US26D	MK	
1	Storeroom Deadbolt Lock	AUR 8840FL Temp Core	626YMS	YA	
1	Interchangeable Core (E09241)	1C (TO SUIT)	626	BE	
1	Electric Strike (E09391)	1600-CDB	630	HS	⚡
1	SMART Pac Bridge Rectifier	2005M3		HS	⚡
1	Surface Closer (C02011 / C02021)	R/PR3501 M (TO SUIT)	689	YA	
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO	
1	Door Stop (L02101)	401	US26D	RO	
3	Silencer (L03011)	608		RO	
1	Position Switch (E08)	DPS-M-BK		SU	⚡
1	Request To Exit Sensor	XMS		SU	⚡
1	Power Supply	BPS-24-1		SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified			

Notes:
• Card reader by security integrator.
• Electronic Operation: Valid card releases electric strike or key retracts latchbolt. Deadbolt thrown shunts valid card entry until retracts of latchbolt and deadbolt by egress lever. Request to exit shows authorized egress. Free egress at all times. In case of power loss, door remains locked and latched.

Set: 19.0

Doors: 6046

1	Continuous Hinge	HT DSH1000-(height) C		PE
1	Privacy Lock (F19)	AUR 8802FL IND	626YMS	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
2	Door Stop (L02101)	401	US26D	RO
1	Emergency Stop	ERS (height)CxHT (TO SUIT)		PE
3	Silencer (L03011)	608		RO

Notes:
• Rescue hardware. Door can swing in opposite direction.

Set: 20.0

Doors: 6001, 6002, 6003, 6005, 6006, 6007, 6008, 6009, 6010, 6011, 6012, 6013, 6014, 6019, 6020, 6033, 6058

0	All Hardware	BY DOOR SUPPLIER		OT

- - - END - - -

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Hollow metal door hung in hollow metal frame at exterior location.
   2. Hollow metal door frames for wood doors and for borrowed lights at interior locations.

1.2 RELATED REQUIREMENTS

A. Door Hardware: Section 08 71 00, DOOR HARDWARE.
B. Glazing: Section 08 80 00, GLAZING.
C. Card Readers and Biometric Devices: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.
D. Intrusion Alarm: Section 28 16 00, INTRUSION DETECTION SYSTEM.
E. Security Monitors: Section 28 23 00, VIDEO SURVEILLANCE.

1.3 APPLICABLE PUBLICATIONS

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.
   2. A250.10-1998 (R2011) – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
C. ASTM International (ASTM):
   1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip.
   2. 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.
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.

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. Include schedule showing each door and frame requirements and fire label and smoke control label for openings.
3. Installation instructions.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

E. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer with project experience list.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured 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. 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.

1.7 STORAGE AND HANDLING2

A. Store products indoors in dry, weathertight, and conditioned facility.

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 SYSTEM PERFORMANCE

A. Design hollow metal doors and frames complying with specified performance:
   1. Fire-Resistance-Rated 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.
   3. Thermal Resistance: 8.7 R-value, minimum at exterior door.

2.2 MATERIALS

A. Sheet Steel: ASTM A1008/A1008M, cold-rolled.

B. Galvanized Sheet Steel: ASTM A653.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide hollow metal doors and frames from one manufacturer.

C. Sustainable Construction Requirements:
   1. Steel Recycled Content: 30 percent total recycled content, minimum.

2.4 HOLLOW METAL DOORS

A. Hollow Metal Doors: ANSI A250.8; 44 mm (1-3/4 inches) thick. See drawings for size and design.
   1. Exterior Doors: Level 3 and Physical Performance Level A, extra-heavy duty; Model 2, seamless.

B. Door Faces:
   1. Sheet steel.
   2. Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.

C. Door Cores:
   1. Polyurethane.

2.5 HOLLOW METAL FRAMES

A. Hollow Metal Frames: ANSI A250.8; Face welded.
   1. Interior Frames:
      a. Wood Doors and Borrowed Lights: 1.3 mm (0.053 inch) thick.
   2. Interior Borrowed Light Frames: 1.3 mm (0.051 inch) thick.

B. Frame Materials:
   1. Interior Frames: Sheet steel. Exception for Door Openings into Patient Toilets: Galvanized sheet steel minimum Z120 or ZF120 (G40 or A40) coating.
   2. Exterior Frames: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.

2.6 LOUVERS (NOT USED)

2.7 FABRICATION

A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.

B. Hollow Metal Door Fabrication:
   1. Close top edge of exterior doors flush and seal to prevent water intrusion.
   2. Fill spaces between vertical steel stiffeners with insulation.

C. Hollow Metal Frame Fabrication:
   1. Fasten mortar guards to back of hardware reinforcements, except on lead-lined frames.
   2. Terminated Stops: ANSI A250.8.
   3. Borrowed Light Frames:
      a. Provide integral stop on exterior, corridor, or secure side of door.
      b. Design rabbet width and depth to receive glazing material or panel shown on drawings.
   4. 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 set in masonry: Provide adjustable anchors designed for friction fit against frame and extended into masonry minimum 250 mm (10 inches). Provide one of following types:
   a) Wire Loop Type: 5 mm (3/16 inch) diameter wire.
   b) T-Shape type.
   c) Strap and stirrup type: Corrugated or perforated sheet steel.
4) 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.
5) Anchors for frames set in prepared openings:
   a) Steel pipe spacers 6 mm (1/4 inch) inside diameter, welded to plate reinforcing at jamb stops, or hat shaped formed strap spacers 50 mm (2 inches) wide, welded to jamb near stop.
   b) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass through frame and spacers.
6) Anchors for observation windows and other continuous frames set in stud partitions.
   a) Weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
   b) Space maximum 600 mm (24 inches) on centers.

7) Modify frame anchors to fit special frame and wall construction.
8) Provide special anchors where shown on drawings and where required to suit application.

2.8 FINISHES

A. Steel and Galvanized Steel: ANSI A250.8; shop primed.
   1. Doors and frames shall be thoroughly cleaned, and chemically treated to ensure maximum paint adhesion. Surfaces of door and frame exposed-to-view shall receive factory-applied coat of rust-inhibiting primer, either air-dried or baked-on. Finish shall meet requirements for acceptance stated in ANSI/SDI A250.10.
B. Finish exposed surfaces after fabrication.

2.9 ACCESSORIES

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: Galvanized steel or stainless steel.
   1. Metal Framing: Steel drill screws.
F. Anchors: Galvanized steel or stainless steel.
G. Galvanizing Repair Paint: MPI No. 18.
H. Insulation: Unfaced mineral wool.

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. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry-film thickness.

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.

2. Install fire frames according to NFPA 80.
3. Install smoke control frames according to NFPA 105.

3.3 FRAME INSTALLATION

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. Masonry Walls:
      a. Embed anchors in mortar.
      b. Fill space between frame and masonry with grout or mortar as walls are built.
   2. Metal Framed Walls: Secure anchors to sides of studs with two fasteners through anchor tabs.
   3. Prepared Openings:
      a. Direct Securement: 6 mm (1/4 inch) diameter expansion bolts through spacers.
      b. Subframe or Rough Buck Securement:
         1) 6 mm (1/4 inch) diameter expansion bolts on 600 mm (24 inch) centers.
         2) Power-activated drive pins on 600 mm (24 inches) centers.
E. Frames for Sound Rated Door Openings: Fill frames with insulation.
F. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.

3.4 DOOR INSTALLATION

A. Install door plumb and level.

B. Adjust door for smooth operation.

C. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.

3.5 CLEANING

A. Clean exposed door and frame surfaces. Remove contaminants and stains.

3.6 PROTECTION

A. Protect doors and frames from traffic and construction operations.

B. Remove protective materials immediately before acceptance.

C. Repair damage.

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SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior flush wood doors with transparent finish.
      a. Fire–resistance-rated doors.
      b. Smoke-rated doors.

1.2 RELATED REQUIREMENTS

A. Paints and Coatings and Composite Wood and Agrifiber VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
B. Door Hardware including Hardware Location (Height): Section 08 71 00, DOOR HARDWARE.
C. Installation of Door Frames and Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES and Section 08 71 00, DOOR HARDWARE.
D. Door Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

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.
C. ASTM International (ASTM):
   1. E90-09 - Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions and Elements.
   2. E2074-00 – Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
D. National Fire Protection Association (NFPA):
   1. 80-16 - Fire Doors and Other Opening Protectives.
   2. 252-12 - Fire Tests of Door Assemblies.
E. UL LLC (UL):
   1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
F. 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.

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. 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–resistance-rated doors showing conformance with NFPA 80.

D. Samples:

1. Corner section of flush veneered door 300 mm (12-inches) square, showing details of construction, labeled to show grade and type number, and conformance to specified standard.
2. Veneer sample 200 mm by 275 mm (8 inch by 11 inch) showing specified wood species sanded to receive a transparent finish. Factory-finish veneer sample where the prefinished option is accepted.

E. Sustainable Construction Submittals:

1. Low Pollutant-Emitting Materials:
   a. Show volatile organic compound types and quantities.

F. Test Reports: Indicate products comply with specifications.

1. Screw-Holding Capacity Test.
2. Cycle-Slam Test.
3. Hinge-Loading Test.

G. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly and presently manufactures specified products.
2. Manufactures specified products with satisfactory service on five similar installations for minimum five years.

1.6 DELIVERY

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.

1.7 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight, and conditioned facility.
   1. Store doors according to ANSI/WDMA I.S. 1A.
B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

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.

1.9 WARRANTY

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.

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide each product from one manufacturer.
C. Sustainable Construction Requirements:
   1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
      a. Paints and coatings.
      b. Composite wood and agrifiber.

2.2 FLUSH WOOD DOORS

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-resistance rating.
   4. Thickness: 44 mm (1-3/4 inches) unless otherwise shown or specified.

B. Faces:
   1. ANSI/WDMA I.S. 1A.
   2. One species throughout Project unless scheduled or otherwise shown.
   3. Transparent-Finished Faces: Premium-Grade rotary-cut, white maple.
      a. A Grade face veneer.
      b. Whole-piece face veneers.
      c. Door Edges: Same species as door face veneer.
      d. In existing buildings, where doors are required to have transparent finish, use wood species, grade, and assembly of face veneers to match adjacent existing doors.
   4. Factory-sand doors for finishing.

C. Wood for Stopsand Moldings for Flush Doors Required to Have Transparent Finish:
   1. Solid wood of same species as face veneer, except maple is acceptable on birch doors.
   2. Glazing:
      a. On non-fire-resistance-rated doors, use applied wood stops nailed tightly on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on center.

D. Fire-Resistance-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-resistance- and smoke-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.

E. 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.

2.3 STILE AND RAIL WOOD DOORS (NOT USED)

2.4 FABRICATION

A. Factory-machine interior wood doors to receive hardware, bevels, undercuts, cutouts, accessories, and fitting for frame.
   1. Factory-fit fire–resistance-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, and undercut where shown.
D. Clearances between Doors and Frames and Floors:
   1. Fire–Resistance-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.

2.5 FINISHES

A. Factory Transparent Finish:

1. Factory-finish flush wood doors.

a. ANSI/WDMA I.S. 1A Section F-3 Finish System Descriptions for System 5, Conversion Varnish or System 7, Catalyzed Vinyl.

b. Use stain when required to produce finish specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

3.1 PREPARATION

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.

3.2 INSTALLATION

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. Install fire–resistance-rated doors according to NFPA 80.

2. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 PROTECTION

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.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Access doors and panels installed in walls and ceilings.

1.2 RELATED REQUIREMENTS

A. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.
B. Field Painting: Section 09 91 00, PAINTING.
C. Access Doors for Control or Drain Valves: Section 21 10 00, WATER-BASED FIRE-SUPPRESSION SYSTEMS.
D. Access Doors for Plumbing Valves: Section 22 40 00, PLUMBING FIXTURES.
E. 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. E119-15 - Fire Test of Building Construction and Materials.
D. National Fire Protection Association (NFPA):
   1. 80-16 - Fire Doors and Other Opening Protectives.
   2. 251-12 - Fire Tests of Door Assemblies.
E. National Association of Architectural Metal Manufacturers (NAAMM):
   1. AMP 500-06 - Metal Finishes Manual.
F. UL LLC (UL):
   1. Listed - Online Certifications Directory.
   2. 10B-08 - Standard for Fire Tests of Door Assemblies.
   3. 263-11 - Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Installation instructions.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, 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. Provide each product from one manufacturer.

B. Sustainable Construction Requirements:

1. Steel Access Doors Recycled Content: 30 percent total recycled content, minimum.

2.3 ACCESS DOORS, FIRE-RATED

A. Door Construction:

1. Ceiling Access Door Construction: ASTM E119 or UL 263.
2. Wall Access Doors: NFPA 252 or UL 10B.

B. Label: Class B opening according to UL 10B or test by another nationally recognized laboratory. 1-1/2 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 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 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. Tamper proof screws (spanner head locks) for access panels in Behavioral Health Areas.

2.5 ACCESS DOOR, RECESSED PANEL, NON-RATED (NOT USED)

2.6 FABRICATION - GENERAL

A. Size: Minimum 600 mm (24 inches) square door unless otherwise shown

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-resistance-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-resistance-rating test.

2.7 FINISHES

A. Steel Paint Finish:
1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
a. One coat primer.
b. One coat thermosetting topcoat.

c. Dry-Film Thickness: 0.05 mm (2 mils) minimum.

2.8 ACCESSORIES

A. Fasteners: Type and size recommended by access door manufacturer, to suit application.
   1. 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 and approved submittal drawings.
   1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
B. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical, and conveyor control items concealed in walls and partitions, and concealed above gypsum board ceilings.
C. Install fire–resistance-rated access door according to NFPA 80.
D. Install fire-resistance-rated doors in fire-resistance-rated partitions and ceilings.
E. Install flush access panels in partitions and in gypsum board 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 with Flanges: Overlap opening, with face uniformly spaced from finish surface.
D. Secure frames to adjacent construction with fasteners.

E. 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.

F. Field Painting of 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.

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SECTION 08 42 43

INTENSIVE CARE UNIT / CRITICAL CARE UNIT ENTRANCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Packaged units consisting of manually operated doors with frames, hardware, and sidelights.
   1. Selected doors, in addition to manual operation, shall be provided with a self-closing device and positive latching mechanism.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants.

B. Section 08 80 00 - Glazing: Installation, cleaning, and maintenance requirements.

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Connection of frame to building ground.

1.03 REFERENCES

A. Definitions:
   1. AHJ: Authority/authorities having jurisdiction.
   2. ICU/CCU: Intensive care unit / critical care unit.
   3. SX Panel: Sliding panel that swings open upon pushing.
   4. SO Panel: Sidelight panel, normally stationary, that will swing open upon pushing.

B. Reference Standards:
   1. AAMA 701/702 - Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals, 2011.
   2. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications, 2012.
   3. ASTM D2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds, 2012.
   4. GANA Glazing Manual, 50th Anniversary Edition.
   5. NFPA 101 - Life Safety Code, 2012 (TIA4, 2013).
   6. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives, 2013.
   7. UL 1784 - Air Leakage Tests of Door Assemblies, Third Edition, (Revised Pages, 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene one week before starting work of this Section.
   1. Conduct conference at Project site.
   2. Review methods and procedures related to Intensive Care Unit/Critical Care Unit Entrances (ICU/CCU) including, but not limited to, the following:
      a. Structural load limitations.
      b. Construction schedule: Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      c. Coordination with glazing and other trades.
      d. Required testing, inspecting, and certifying procedures.

B. Coordination:
   1. Templates:
      a. Obtain and distribute, to the parties involved, templates for doors, frames, and other work specified to be factory prepared for installing ICU/CCU entrance doors.
      b. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing ICU/CCU entrance doors to comply with indicated requirements.

1.05 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, for submittal procedures.

B. Product Data; manufacturer's catalog data, detail sheets, and specifications, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

C. Shop Drawings: Prepared specifically for this Project; show dimensions of doors, sidelights, details of construction, and interface with other products.

D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

E. Product Certificates: For each type of emergency breakaway entrance door, signed by product manufacturer.

F. Qualification Statements: For manufacturer and installer.

G. Closeout Submittals:
   1. Operating and Maintenance Data: Operating and maintenance instructions, and parts lists.
   2. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than three years of experience.
   1. Company to have certificate issued by American Association of Automatic Door Manufacturers (AAADM).

B. Installer Qualifications: Company specializing in installing entrances of this type.
   1. An authorized representative of ICU/CCU entrance door manufacturer who is AAADM-trained and -certified for installation and maintenance of units required for this Project.
   2. Maintenance Proximity:
      a. Not more than two hours' normal travel time from Installer's place of business to Project site.

C. Welding: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code--Aluminum."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in factory packaging, protected from damage.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store products under cover and elevated above grade.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify openings to receive ICU/CCU entrance door assemblies by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions:
      a. Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating ICU/CCU entrance door assemblies without field measurements.
      b. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

1.09 COORDINATION

A. Templates:
   1. Obtain and distribute, to the parties involved, templates for doors, frames, and other work specified to be factory prepared for installing ICU/CCU entrance doors.
   2. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing ICU/CCU entrance doors to comply with indicated requirements.

1.10 WARRANTY

A. Special Assembly Warranty:
   1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of ICU/CCU entrance door assemblies that fail in materials or workmanship within specified warranty period.
      a. Failures include, but are not limited to, the following:
         1) Structural failures including, but not limited to, excessive deflection.
         2) Faulty operation of operators and hardware.
         3) Deterioration of metals, metal finishes, and other materials beyond normal use.
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. ICU/CCU Entrances:
   1. Basis-of-Design Products:
      a. Self-Closing, Smoke-Rated ICU/CCU Entrances: Horton Automatics 310 Series with Floor-Mounted Bottom Guide under Inactive Leaf: www.hortondoors.com.
   2. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
      a. ASSA ABLOY Entrance Solutions: www.besam-usa.com.
      b. record-usa: www.record-usa.com.

B. Source Limitations: Obtain ICU/CCU entrances through a single supplier from one of the manufacturers listed above. Obtaining ICC/CCU entrances through *more than one* supplier or from *more than one* manufacturer will not be acceptable.

2.02 PERFORMANCE REQUIREMENTS

A. Smoke and Draft Control: Provide smoke and draft control system on doors. Smoke and draft control system shall provide an effective barrier for limiting the passage of smoke through ICU/CCU door assemblies. Smoke and draft control system shall comply with the following:
   1. The maximum air leakage rate for door assemblies shall be 3.0 cubic feet per minute per square foot of door opening at 0.30 in water column for both the ambient and elevated temperature tests, in accordance with the International Building Code, and NFPA 101.
   2. Door shall be tested in accordance UL 1784.
   3. Installation shall be in accordance with NFPA 105.

2.03 ENTRANCE ASSEMBLIES

A. Entrance Assemblies: Factory-assembled, manually operated, extruded-aluminum door and frame with normally-closed but operable sidelights, complete with all hardware and operating components.
   1. Door and Sidelight Construction: Heavy-duty interlocked extruded tubular sections, through-rod bolted construction with steel corner support at hinge stile of carrier-suspended swinging panels to reduce sag in sliding or breakout mode.
   2. Mounting: Between jamb.
   3. Finish: Class I; clear anodized.
   4. Antimicrobial Finish: Provide EPA-approved silver-based antimicrobial coating on all exposed metal parts, including door handles.

B. Dimensions:
   1. Overall Frame Width (Outside): As indicated on the drawings.
   2. Clear Opening Width: As indicated on the drawings, when all swinging panels are fully open.
   3. Overall Frame Height: As indicated on the drawings.
   4. Panel Thickness: 1-3/4 inch.
   5. Header Height: 6 inches, nominal.
   6. Jamb Width: 1-3/4 inch.
   7. Frame Depth: As required to suit suspension, swing control, and wall opening.
   8. Stile Width: 2 inches, nominal.
   9. Top Rail Height: 3-1/2 inches, nominal.
   10. Bottom Rail Height: 4 inches, nominal.
   11. Intermediate Rail Height: 2-1/4 inches, nominal.
   12. Glazing Stops: 1/2 inch.
   13. Glazing Thickness: 1/4 inch.

C. Full Width "Breakaway" Sliding Entrances: Normal operation consisting of side-sliding panel bypassing sidelight(s); all panels including sidelights having breakaway function; sliding panels bypassing on "non-swing side" of sidelight.
   1. Panels: Two; one sidelight, one bypassing.

2. Swing Direction: Panels to swing out into corridor.

2.04 COMPONENTS

A. Aluminum Extrusions for Doors, Sidelights, Headers, and Trim: Alloy as recommended by manufacturer for construction and specified finish; nominal 0.125-inch wall thickness.

B. Sliding Door Header: Track and suspension system concealed with removable cover.
   1. Track: Extruded aluminum, with anti-rising, anti-derailing design, flush with framing.
   2. Door Suspension System: Two wheeled carriers per panel, with steel ball bearings; wheel diameter minimum 1-1/4 inch.
   3. Door Hanger Brackets: Nylon wheels with hardened steel bearings.
   4. Provide hinged or removable access panels for service and adjustment, provide tamper resistant fasteners to prevent unauthorized access.

C. Breakaway Mechanism: 90-degree swing from any position in sliding cycle, released under not more than 50 pounds-force pressure at strike stile of panel, self-closing, with sufficient strength to support weight of panels without drooping or racking.
   1. Release Mechanism: Spring-loaded stainless-steel ball detent latch.
   2. Swing Control: Torsion spring.
   3. Provide entrance units having UL label as exitway.
   4. Support doors from carrier assembly by cantilever and pivot assembly.

D. Glazing Stops: Manufacturer's standard snap-on extruded aluminum square stops with preformed resilient glazing gaskets.

E. Hardware:
   1. Pulls: Manufacturer's standard recessed units on both sides of each operable door and surface-mounted, D-shaped pull for each swing-out sidelite.
   2. Door Gasketing:
      a. Manufacturer's standard compressible type; made of ASTM D2000, molded neoprene, or ASTM D2287, molded polyvinyl-chloride (PVC).
      b. Sliding Type: AAMA 701/702 made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
   3. Door Sweeps: Manufacturer's standard, nylon brush sweep mounted to underside of door bottom.
   4. Include the following hardware.
      a. Smoke Seal: Provide manufactures standard smoke and draft control components as required to meet performance specifications. Components include, but are not limited to, rubber stile, top rail, and hanger seals.
      b. Self-closing mechanism: Fully concealed spring closer.
      c. Positive Latch:
         1) Provide latch that will latch the active leaf in place when closed.
         2) Provide lever handle on each side of the active leaf door to unlatch the sliding door.

F. Glazing: 1/4 inch thick fully tempered float glass, clear.

2.05 FABRICATION

A. General:
   1. Factory-assemble ICU/CCU entrance door components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
      a. Form aluminum shapes before finishing.
      b. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish.
         1) Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
      c. Use concealed fasteners to greatest extent possible.
      d. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.
      e. Where fasteners are subject to loosening or turning out from structural movements or vibration, use self-locking devices.
      f. Reinforce members as required to receive fastener threads.

B. Framing:
   1. Provide ICU/CCU entrance doors as prefabricated assemblies.
   2. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
      a. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints.
         1) Provide subframes and reinforcement as required for a complete system to support required loads.
      b. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
      c. Form profiles that are straight and free of defects or deformations.
      d. Prepare components to receive concealed fasteners and anchor and connection devices.
      e. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
      f. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.

C. Doors:
   1. Factory-fabricated and -assembled in profiles indicated.
   2. Reinforce as required to support imposed loads and for installing hardware.

D. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

E. Hardware:
   1. Factory-install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.
   2. Cut, drill, and tap for factory-installed hardware before applying finishes.

a. Provide sliding weather stripping, mortised into door, at perimeter of sliding doors and breakaway sidelites.

F. Electrical Grounding: Fabricate ICU/CCU entrance doors to be internally grounded, complying with requirements of AHJ.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that openings are plumb, square, and ready for installation of entrances.

B. Verify that overhead support is properly located and securely anchored.

C. Do not begin installation until substrates have been properly prepared.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Where aluminum components will contact different metals, prior to installation paint contact surfaces with primer or apply sealant or tape recommended by manufacturer for protection against galvanic action.

D. Where aluminum components will contact concrete, prior to installation paint contact surfaces with bituminous paint.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, except where requirements that are more stringent are specified.

B. Install entrances securely anchored in place, plumb, level, and true to location, in alignment with established lines and grades, without warp, bow, or racking of members.

C. Where frames are assembled in field, fit frame joints hairline tight without burrs or distortion; rigidly secure nonmoving joints and seal watertight.

D. Install field-installed hardware using concealed fasteners to the greatest extent possible.

E. Install glazing in accordance with requirements of Section 08 80 00.

F. Grounding: Connect ICU/CCU entrance door electrical grounding systems to building grounding system as specified in Division 26 sections.

G. Seal joint between perimeter of frame and adjacent construction with sealant, both sides, tooled concave, closing all gaps between frame and adjacent construction, unless otherwise indicated.

H. Install sealants in accordance with requirements of Section 07 92 00 - Joint Sealants.

I. Adjust for proper operation, without binding or scraping and without excessive noise; lubricate operating hardware and other moving parts.

J. After operation of the completed installation for minimum of 300 cycles, readjust and re-lubricate.

3.04 CLEANING

A. Clean installed glass and aluminum surfaces promptly after installation to like-new condition.
   1. Remove excess glazing and sealant compounds, dirt, and other substances.
   2. Repair damaged finish to match original finish.
   3. Comply with requirements in Section 08 80 00 - Glazing for cleaning and maintaining glass.

3.05 CLOSEOUT ACTIVITIES

3.06 PROTECTION

A. Protect installed products until completion of Project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

- - - END - - -

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum windows for new construction.

1.2 RELATED REQUIREMENTS

A. Sealing Joints: Section 07 92 00, JOINT SEALANTS.
B. Glazing: Section 08 80 00, GLAZING.
C. Color of Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. American Architectural Manufacturers Associations (AAMA):
   1. AAMA/WDMA/CSA 101/I.S.2/A440-11 – North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
   2. AAMA 502-07 – Comparative Analysis Procedure for Window and Door Products.
   3. AAMA 505-09 - Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure.
   4. AAMA 2605-13 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
   5. AAMA TIR A8-08 - Structural Performance of Composite Thermal Barrier Framing Systems.
C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
   1. 7-10 - Minimum Design Loads for Buildings and Other Structures.
D. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
   1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
E. ASTM International (ASTM):
   1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
   2. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

3. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
4. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
5. E283-04(2012) - Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
6. E331-00(2009) - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

F. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-06 – Metal Finishes Manual.

1.4 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting at Project site minimum 30 days before beginning Work of this Section.
1. Required Participants:
a. Contracting Officer's Representative.
b. Inspection and Testing Agency.
c. Contractor.
d. Installer.
e. Manufacturer's field representative.
2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
a. Installation schedule.
b. Installation sequence.
c. Preparatory work.
d. Protection before, during, and after installation.
e. Installation.
f. Transitions and connections to other work.
g. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTAL

A. Submit according to Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Indicate window types required for Project.
   2. Identify window unit components by name and type of metal or material; show construction, trim, installation, and anchorages.
   3. Include glazing details and standards for factory-glazed units.
C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.
   3. Warranty.
D. Samples:
   1. Window Frame: 150 mm (6 inch) long samples showing finishes, specified.
E. Test Reports: Indicate each product complies with specifications.
   1. Windows.
F. Certificates: Indicate each product complies with requirements (window characteristics may be on Window Schedule or other Drawings).

1.6 QUALITY ASSURANCE

A. Manufacturer 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. Quality Certified Labels or Certificates:
   1. AAMA Label affixed to each window indicating compliance with specification.
   2. Certificates in lieu of label with copy of test report maximum 4-years old from independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA/WDMA/CSA 101/I.S.2/A440 for type of window specified.

1.7 STORAGE AND HANDLING

A. Protect windows from damage during handling and construction operations before, during, and after installation.
B. Store windows under cover, setting upright.

C. Do not stack windows flat.
D. Do not lay building materials or equipment on windows.

1.8 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
B. Manufacturer's Warranty: Warrant windows against material and manufacturing defects.
   1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design windows complying with specified performance:
   1. Load Resistance: ASCE/SEI 7.
      a. Performance Grade: AAMA/WDMA/CSA 101/I.S.2/A440 required to resist maximum positive and negative wind load.
   2. Thermal Transmittance: Maximum U-value W/sq. m/degree K (Btu/sq. ft./hr./degree F).
      a. Insulating Glass Windows: U-2.8 (U-0.5).
      b. Dual-Glazed Windows: U-4.0 (U-0.7), or as required by ASHRAE 90.1.
   3. Condensation Resistance Factor (CRF): NFRC 500 Minimum CRF of C 55.
   4. Water Resistance: ASTM E331; No uncontrolled penetration at 390 Pa (8.00 psf), minimum, pressure differential.
   5. Air Infiltration Resistance: ASTM E283; 0.5 L/s/sq. m (0.1 cfm/sq. ft.), maximum at 300 Pa (6.24 psf), minimum, pressure differential.
B. Provide the following for locations indicated on the Drawings.
   1. Fixed Windows:
      a. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440, minimum AW-40.

2.2 MATERIALS

A. Aluminum Extrusions: ASTM B221M (ASTM B221); 6063 alloy, T5 temper.
B. Aluminum Sheet: ASTM B209M (ASTM B209); 5005 alloy, H15 or H34 temper.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide windows from one manufacturer.

2.4 ALUMINUM WINDOWS

A. Frames and Sashes: Aluminum extrusions, AAMA/WDMA/CSA 101/I.S.2/A440.

B. Thermal-Break Window Construction:

1. Manufacturer’s Standard.
2. Low-conductance thermal barrier.
3. Thermal Break Assemblies: Tested according to AAMA TIR A8 and AAMA 505.

C. Mullions: Match window units.

D. Provide anchors and other related accessories required for installation.

E. Muntins/Grilles (Simulated Divided Lites (SDL)): Grilles permanently installed on outside face of insulating glass.

1. Pattern: Custom design, see drawings.
2. Bar Width: Match existing.
3. Color: Match interior and exterior finishes of sash.

2.5 GLAZING

A. Glass and Glazing: As specified in Section 08 80 00, GLAZING.

1. Factory-glaze windows.
2. Weep holes through glazed areas are not acceptable.

2.6 INSECT SCREENING (NOT USED)

2.7 HARDWARE (NOT USED)

2.8 FABRICATION

A. Fabricate windows to comply specified performance class and grade.

1. Where extrusion wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.

B. Aluminum Trim:

1. Trim includes casings, closures, and panning.
2. Fabricate to shapes shown, minimum 1.6 mm (0.062 inch) thick.
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces.

4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with minimum 3 mm (1/8 inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and spaced maximum 300 mm (12 inches) on center.
7. Design to allow unrestricted expansion and contraction of members and window frames.
8. Secure to window frames with machine screws or expansion rivets.
9. Exposed screws, fasteners, or pop rivets will not be acceptable on exterior of casing or trim cover system.

C. Aluminum Subsills and Stools:
1. Fabricate to shapes shown, minimum 2 mm (0.080 inch) thick extrusion.
2. One-piece full-length of opening with concealed anchors.
3. Sills turned up back edge minimum 6 mm (1/4 inch). Front edge provide with drip.
4. Conceal sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

2.9 FINISHES

A. Finish window units according to NAAMM AMP 500.

B. Anodized Aluminum (Interior):
1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.

C. Aluminum Paint Finish (Exterior):
1. Fluorocarbon Finish: AAMA 2605; 70-percent fluoropolymer resin, two-coat system.
2. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.

2.10 ACCESSORIES

A. Fasteners: AAMA/WDMA/CSA 101/I.S.2/A440; non-magnetic stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
   1. Verify openings are within acceptable tolerances.
B. Protect existing construction and completed work from damage.
C. Remove existing windows to permit new installation when replacement window is available, and ready for immediate installation.
   1. Remove existing work carefully; avoid damage to existing work indicated to remain.
   2. Perform other operations as necessary to prepare openings for proper installation.
   3. Do not leave openings uncovered at end of working day, and during precipitation or temperatures below 16 degrees C (60 degrees F).

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. Where type, size, or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, provide expansion or toggle bolts or screws, as best suited to construction material.
   1. Provide bolts or screws minimum 6 mm (1/4 inch) in diameter.
   2. Sized and spaced to resist tensile and shear loads imposed.
   3. Do not install exposed fasteners on exterior.
   4. Provide non-magnetic stainless-steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners in behavioral health areas.
   5. Locate fasteners to avoid disturbing window thermal break.
C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.
D. Anchor windows on four sides with anchor clips.
   1. Do not allow anchor clips to bridge thermal breaks.
   2. Use separate clips for both sides of thermal breaks.

3. Make connections to allow for thermal and other movements.
4. Do not allow building load to bear on windows.
5. Use manufacturer's standard clips at corners and maximum 600 mm (24 inches) on center.

E. Sills and Stools:
1. Set in bed of mortar or other compound to fully support, true-to-line shown.
2. Do not extend sill to inside window surface or past thermal break.
3. Leave space for sealants at ends and to window frame unless indicated otherwise.

3.3 MULLIONS CLOSURES, TRIM, AND PANNING

A. Cut mullion full height of opening and anchor directly to window frame on both sides.

B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.
1. Secure to solid masonry with expansion bolts, expansion rivets, split-shank drive bolts, or powder-actuated drive pins.
2. Toggle bolt to hollow masonry units.
3. Screw to wood and metal.

C. Fasten (except for strap anchors), near ends and corners and maximum 300 mm (12 inches) on center.

D. Seal units following installation to provide weathertight system.

3.4 ADJUSTING (NOT USED)

3.5 FIELD TESTING

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

B. Test Method: AAMA 502.

C. Test Specimen:
1. Include window assembly and construction. Affix test chamber to interior side of test specimen and the conduct testing using positive static air pressure (Test Method A).
2. Test specimens to be selected by the Contracting Officer's Representative after windows have been installed according to the drawings and specification.

3.6 CLEANING

A. Remove excess glazing and sealant compounds.

B. Clean exposed aluminum and glass surfaces. Remove contaminants and stains.

- - E N D - -

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

B. Section 08 06 71, DOOR HARDWARE SCHEDULE.

C. Application of Hardware: Section 08 14 00, INTERIOR WOOD DOORS, Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 42 43, INTENSIVE CARE UNIT/CRITICAL CARE UNIT (ICU/CCU) ENTRANCES, and Section 08 71 13, AUTOMATIC DOOR OPERATORS.

D. Concealed blocking for wall-mounted door stops: Section 06 10 00, ROUGH CARPENTRY.

E. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

F. Painting: Section 09 91 00, PAINTING.

G. Card Readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.

H. Electrical: Division 26, ELECTRICAL.

I. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide fire-rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

E. The following items shall be of the same manufacturer, except as otherwise specified:
   1. Mortise locksets.
   2. Hinges for hollow metal and wood doors.
   3. Surface-applied overhead door closers.
   4. Exit devices.

1.4 WARRANTY

A. Door hardware shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:
   1. Locks, Latchsets, and Exit Hardware: 5 years.
   2. Door Closers and Continuous Hinges: 10 years.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article entitled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit six copies of the schedule per Section 01 33 23. Submit two final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire-rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:
   1. Samples: All hardware items (proposed for the Project) that have not been previously approved by Builders Hardware Manufacturers

Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.

2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

A. Deliver items of hardware to Project site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR’s office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the Project.

B. Store items off ground, under cover, protected from weather and construction activities.

1.8 PREINSTALLATION MEETING

A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this Section, including Contractor and Installer, VA Locksmith, Hardware Consultant, and Hardware Manufacturer’s Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.
6. Installation.
7. Adjusting.

8. Repair.
9. Field quality control.
10. Cleaning.

1.9 INSTRUCTIONS

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds, and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.

B. Keying: All cylinders shall be keyed into existing Best Great Grand Master Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Keying information shall be furnished at a later date by the COR.

1.10 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

B. ASTM International:

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A115 (Latest Edition....Steel Door and Frame Preparation for Hardware of Relevant Portion)

A156.1-06.....Butts and Hinges

A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts

A156.4-08.....Door Controls (Closers)

A156.5-14.....Cylinders and Input Devices for Locks.

A156.6-05.....Architectural Door Trim

A156.8-05.....Door Controls-Overhead Stops and Holders

A156.13-05.....Mortise Locks and Latches Series 1000

A156.16-08.....Auxiliary Hardware

A156.18-06.....Materials and Finishes

A156.21-09.....Thresholds

A156.22-05.....Door Gasketing and Edge Seal Systems

A156.26-06.....Continuous Hinges

A156.28-07 .....Master Keying Systems

A156.31-07 .....Electric Strikes and Frame Mounted Actuators

D. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Other Opening Protectives

101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle hinges. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins.
2. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high-humidity areas (toilet rooms, janitor rooms, and the like) shall be of stainless-steel material.

B. Provide quantity and size of hinges per door leaf as follows:

1. Doors up to 1210 mm (4 feet) high: 2 hinges.
2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
7. Provide heavy-weight hinges where specified.
8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

2.2 CONTINUOUS HINGES

A. ANSI/BHMA A156.26, Grade 1-600.
   1. Listed under Category N in BHMA's "Certified Product Directory."
B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete
C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
   1. Base Metal for Exterior Hinges: Stainless steel.
   2. Base Metal for Interior Hinges: Stainless steel.
   3. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel.
   4. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
   5. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide-throw hinges of minimum width required.
   6. Provide with manufacturer’s cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
   7. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
   8. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer’s adjustable threaded stud and machine-screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

2.3 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer for each type specified.

2.4 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.
B. Closers shall conform to the following:
   1. The closer shall have minimum 50-percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.

2. Where specified, closer shall have hold-open feature.
3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high-strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless-steel material.
7. Closers shall have full-size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory-templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall-mounted or overhead stop cannot be used.
11. Provide parallel-arm closers with heavy-duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel-arm type except where conditions require use of top-jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½″ (38mm) minimum piston diameter.
15. Mount closers:
    a. On the public side of doors to rooms with patient access.
    b. On the secure side of doors that need to automatically lock or latch, such as Store Rooms and Soiled Utility Rooms.
    c. On the secure side of doors to the following rooms:

1) Electrical rooms.
2) EC FMS.
3) Staff toilet rooms.
4) Storage rooms.
5) Medication rooms.

2.5 FLOOR CLOSERS AND FLOOR PIVOT SETS (NOT USED)

2.6 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For masonry construction, use lead expansion shields for mounting door stops.

C. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

D. Provide appropriate door-mounted stop on doors in individual toilets where wall-mounted stops cannot be used.

L. Where the specified wall stop cannot be used, provide concealed overhead stop.

2.7 OVERHEAD DOOR STOPS AND HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110-degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.8 FLOOR DOOR HOLDERS (NOT USED)

2.9 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core

from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the installation of final cores.

B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design matching existing. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations, provide non-ferrous mortise lock case.
2. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.36.
3. Locks on designated doors in Psychiatric (Mental Health) areas shall be paddle type with arrow projection covers and be UL-Listed. Provide these locks with paddle in the down position on both sides of the door. Locks shall be fabricated of wrought stainless steel.

2.10 PUSH-BUTTON COMBINATION LOCKS (NOT USED)

2.11 ELECTROMAGNETIC LOCKS (NOT USED)

2.12 ELECTRIC STRIKES

A. ANSI/ BHMA A156.31 Grade 1.

B. General: Use fail-secure electric strikes at fire-rated doors.

2.13 KEYS

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	**Quantity**
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way

Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	2 keys

B. Psychiatric keys shall be cut so that first two bittings closest to the key shoulder are shallow to provide greater strength at point of greatest torque.

2.14 KEY CABINET (NOT USED)

2.15 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates as specified below:

1. Kick plates, mop plates and armor plates of metal, Type J100 series.
2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick plates and/or mop plates are not required on following door sides:
   a. Armor plate side of doors;
   b. Exterior side of exterior doors;
   c. Closet side of closet doors;
   d. Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.

2.16 EXIT DEVICES

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.

C. At non-fire-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

D. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.17 FLUSH BOLTS (LEVER EXTENSION)

A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.

C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.18 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than

20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.19 DOOR PULLS WITH PLATES (NOT USED)

2.20 PUSH PLATES (NOT USED)

2.21 COMBINATION PUSH AND PULL PLATES (NOT USED)

2.22 COORDINATORS (NOT USED)

2.23 THRESHOLDS

A. Conform to ANSI A156.21, mill-finish extruded aluminum. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless-steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. At exterior doors, provide threshold with non-slip abrasive finish.

C. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.24 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS (NOT USED)

2.25 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.26 MISCELLANEOUS HARDWARE

A. Access Doors (including Sheet Metal Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E07213, conforming to ANSI A156.11. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Cylinders for Various Doors: Key cylinders same as entrance doors of area in which doors occur. Provide cylinders to operate locking devices where specified.

1. Fire-rated access doors-Engineer's key set.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel door frame, except at fire-rated frames and frames for sound-resistant doors. Furnish three mutes for single doors and two mutes for each pair of doors.

2.27 PADLOCKS FOR VARIOUS DOORS, GATES AND HATCHES (NOT USED)

2.28 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS (NOT USED)

2.29 HINGED WIRE GUARDS (FOR WINDOWS, DOORS AND TRANSOMS) AND WIRE PARTITION DOORS (NOT USED)

2.30 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on hinges, closers, thresholds, and the like, shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 626 or 630.
2. Hinges --interior doors: 652 or 630.
3. Door Closers: Factory-applied paint finish. Dull or Satin Aluminum color.
4. Thresholds: Mill-finish aluminum.
5. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Anti-microbial Coating: All hand-operated hardware (levers and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.31 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	**Base Metal**
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings, locate hardware on doors at heights to match existing hardware. The Contractor shall visit the Project site, verify location of existing hardware and submit locations to VA COR for approval.

B. For new buildings locate hardware on doors at heights specified below, with all hand-operated hardware centered within 864 mm (34 inches) to 1200 mm (48 inches), unless otherwise noted:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Locate other hardware at standard commercial heights.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors except bathroom and anteroom doors which shall have closer installed parallel arm on exterior side of doors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by COR. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to solid masonry. Fiber or ”Rawl” plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; show in presence of COR that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the COR for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on Project.

3.3 FINAL INSPECTION

A. Installer to provide letter to COR that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of COR and VA Locksmith.

3.5 HARDWARE SETS (NOT USED – SEE SECTION 08 06 71 – DOOR HARDWARE SCHEDULE)

- - - E N D - - -

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Automatic operators for swinging and sliding 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. Sustainable Construction Submittals:
   1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
E. Test Reports: Certify each product complies with specifications.
F. Qualifications: Substantiate qualifications comply with specifications.
   1. Manufacturer with project experience list.
   2. Installer with project experience list.
G. 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 manufacturer of 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. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide door operators from one manufacturer.
C. Provide one type of operator throughout Project.
D. Sustainable Construction Requirements:
   1. Steel Recycled Content: 30 percent total recycled content, minimum.
   2. Aluminum Recycled Content: 80 percent total recycled content, minimum.

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, with 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 shall provide cushioning action during at last part of door travel, in both opening and closing cycle.
   5. Operators shall be capable of recycling doors instantaneously to full-open position from any point in closing cycle when control switch is activated.
   6. When automatic power is interrupted or shut-off, doors shall 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 and mechanical spring and bearings, located in aluminum case and filled with special lubricant for extreme temperature conditions. Rubber-mount 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 indicators 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 SLIDING DOOR OPERATORS

A. Operator Function:
1. Electric motor pulling door from closed to open position, stopping door by electrically reducing voltage and stalling door against mechanical stop.
2. Opening and Closing Speeds: Field adjustable.
3. System permitting manual control of door in event of power failure.

B. Power Operator:
1. Completely assembled and sealed electromechanical operating unit including 95 W (1/8 hp.) DC shunt-wound permanent-magnet motor with sealed bearings, located in aluminum case and filled with special lubricant for extreme temperature conditions. Rubber-mount units with provisions for easy maintenance and replacement, without removing door from pivots or frame.
2. Opening and Closing Cycle: Field adjustable.

C. Operator Housing:
1. ASTM B209, Type 6063-T5 aluminum alloy, 150 mm (6 inches) wide by 200 mm (8 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.

2.5 SLIDING DOOR UNITS

A. Provide door panels in compliance with NFPA 101, allowing "breakout" to full-open position to provide instant egress at any point in door’s movement.
1. Door Panels: ASTM A1008/A1008M, steel sheet, Type B, cold-rolled, reinforce frame structure, minimum 1.1-mm (0.043 inch) thick steel shapes.

B. Sliding Door Hardware Guide Rollers, Door Carrier:

1. Rollers: Steel or plastic rollers with sealed bearings with each door having two support rollers and one anti-rise roller.
   a. Vertical Adjustment: Minimum 9 mm (0.35 inch) with positive mechanical locks.
   b. Include two urethane-covered oil-impregnated bearing bottom rollers attached with 5 mm (3/16 inch) thick formed-steel guide brackets at each door.
   c. Door Carriers: For each door carrier supporting door leaf, include vertical steel reinforcing member to prevent sagging when door is swung under breakaway conditions.
      1) Carbon-Steel Brackets and Fittings: Corrosion resistant.

C. Locking Hardware:
   1. Locking hardware at interior doors not requiring physical security is not required.
   2. Doors with flush concealed vertical-rod panic hardware integrated into doors where physical security is required and free egress is required at all times.
   3. Doors with manufacturers’ standard hookbolt lock (keyed both sides) where physical security is required and free egress is not required at all times.
      a. At doors with access control devices specified in Division 28 - ELECTRONIC SAFETY AND SECURITY, provide doors with electronic deadbolt locking to prevent doors from manually sliding open.

D. Door Closers: Breakout or swing-out panels with door closers concealed in top rail of door.

2.6 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.

2.7 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 inch by 4 inch), with 13 mm (l/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 direct current (DC).
5. Design units to be unaffected by cleaning material, solvents, dust, dirt, and outdoor weather conditions.

2.8 SAFETY DEVICES

A. Sliding Doors:
1. Two photoelectric beams mounted at heights of 600 mm (24 inches) and 1200 mm (48 inches) in door frame.
2. Overhead safety presence sensors at door head on both sides of opening.
3. Recycle doors to full-open position when beams are interrupted.
4. Motion detector mounted on both sides of door for detection of traffic in both directions.

B. 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.

C. 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 pairs of 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.

- - E N D - -

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies the following:

1. Glass.
2. Plastic glazing.
3. Glazing materials and accessories for both factory- and field-glazed assemblies.
4. Glazing units with integral louvers in door leaves.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Factory-glazed by manufacturer in following units:

1. Sound-Resistant Doors and Vision Control Doors and Borrowed Lites: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, INTERIOR WOOD DOORS.
2. Non-Automatic Sliding Glass Doors: Section 08 42 43, INTENSIVE CARE UNIT / CRITICAL CARE UNIT DOORS.
3. Ballistic Resistance (BR) rated frames: Section 08 34 53, SECURITY DOORS AND FRAMES and Section 08 41 13, ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.
4. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
5. Aluminum Windows: Section 08 51 13, ALUMINUM WINDOWS.
6. Access Control Systems: Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.

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 National Fenestration Rating Council (NFRC) label requirements.
3. Temporary labels shall remain intact until glass and plastic material 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 Safety Glass Certification Council (SGCC) label requirements.
   a. Tempered glass.
   b. Laminated glass or have certificate for panes without permanent label.
3. Bullet-resistance glass assemblies:
   a. Bullet-resistance glass assemblies in accordance with UL 752 requirements for power rating specified.
   b. Identify each security glazing permanently with glazing manufacturer's name, date of manufacture, product number, and DOS Code number inconspicuously located in lower corner on protective side and visible after glazing is framed.
   c. The "attack (threat) side" is to be identified in bold lettering on each side of glazing with removable label.
4. 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 Glass Association of North America (GANA) Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is to withstand applied loads, thermal stresses, thermal movements, building movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; 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 (AHJs). 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.
   2. Design Wind Pressures: As indicated on Construction Documents.
   3. Wind Design Data: As indicated on Construction Documents.
   4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more

than the structural capacity of the glazing unit, the threshold at which frame engagement is no longer safely assured, 1/100 times the short-side length, or 19 mm (0.75 inch), whichever is less.

C. Ballistic-resistant glass assemblies:
   1. For ballistic-resistant units, comply with requirements in UFC 4-010-01, Physical Security Design Manual for VA Facilities, and project-specific criteria provided by VA.
   2. Spall Resistance: Laminated glazing is not permitted to produce spall to interior (protected side) when impacted with scheduled ballistics.
   3. Tolerances:
      a. Outside dimensions: Overall outside dimensions (height and width) of laminated security glazing shall maintain tolerance of ± 3 mm (± 0.12 inch).
      b. Warpage: Out-of-flat (warpage or bowing) condition of laminates shall not exceed 2.5 mm per lineal meter (0.10 inch per 3.3 lineal foot). The condition, if present, shall be localized to extent not greater than 0.75 mm (0.03 inch) for any 0.3 meter (0.98 feet) section.

D. Building Enclosure Vapor Retarder and Air Barrier:
   1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
   2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

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.
   2. Certificate on solar heat gain coefficient when value is specified.
   3. Certificate on "R" value when value is specified.
   4. Certificate test reports confirming compliance with specified bullet-resistive rating.

D. Manufacturer Warranty.

E. Manufacturer's Literature and Data:

1. Glass, each kind required.
2. Insulating glass units.
3. Elastic compound for metal sash glazing.
4. Glazing cushion.
5. Sealing compound.
6. Bullet-resistive material.
7. Plastic glazing material, each type required.

F. Samples for Verification:

1. Size: 305 mm by 305 mm (12 inches by 12 inches).
2. Laminated glass with uniform white interlayer.

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 crates is required. Do not open crates except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling 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.

2. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
3. Temporary Protections: The glass front and polycarbonate back of glazing are to be temporarily protected with compatible, peel-able, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces is to be approved and applied by manufacturer.
4. Edge Protection: To cushion and protect glass-clad polycarbonate edges from contamination or foreign matter, the four (4) edges shall be sealed the depth of glazing with continuous standard-thickness thermoplastic rubber tape. Alternatively, continuous channel-shaped extrusion of thermoplastic rubber shall be used, with flanges extending into face sides of glazing.
5. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 degrees C (60 to 75 degrees F), during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS:

A. Field Measurements: Field-measure openings before ordering tempered glass products to assure 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. Bullet-resistive plastic material to remain visibly clear without discoloration for ten (10) years.
2. Insulating glass units to remain sealed for ten (10) years.
3. Laminated glass units to remain laminated for five (5) years.

4. Polycarbonate to remain clear and ultraviolet-light-stabilized 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. American Society of Civil Engineers (ASCE):

7-10.....Wind Load Provisions

E. ASTM International (ASTM):

C864-05(R2011).....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-14a.....Elastomeric Joint Sealants

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

C1349-10.....Standard Specification for Architectural Flat Glass Clad Polycarbonate

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

E1886-13a.....Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials

E1996-14a.....Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

E2190-10.....Insulating Glass Unit

F1233-08.....Standard Test Method for Security Glazing Materials and Systems

F1642-12.....Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

F. Code of Federal Regulations (CFR):

16 CFR 1201-10.....Safety Standard for Architectural Glazing Materials

G. Glass Association of North America (GANA):

2010 Edition.....GANA Glazing Manual

2008 Edition.....GANA Sealant Manual

2009 Edition.....GANA Laminated Glazing Reference Manual

2010 Edition.....GANA Protective Glazing Reference Manual

H. International Code Council (ICC):

IBC.....International Building Code

I. Insulating Glass Certification Council (IGCC)

J. Insulating Glass Manufacturer Alliance (IGMA):

TB-3001-13.....Guidelines for Sloped Glazing

TM-3000.....North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use

K. Intertek Testing Services – Warnock Hersey (ITS-WHI)

L. National Fire Protection Association (NFPA):

80-16.....Standard for Fire Doors and Other Opening Protectives

252-12.....Standard Methods of Fire Tests of Door Assemblies

257-12.....Standard on Fire Test for Window and Glass Block Assemblies

M. National Fenestration Rating Council (NFRC).

N. Safety Glazing Certification Council (SGCC) 2012:

Certified Products Directory (Issued Semi-Annually).

O. Underwriters Laboratories, Inc. (UL):

263-14.....Fire Tests of Building Construction and Materials

752-11.....Bullet-Resisting Equipment.

P. Unified Facilities Criteria (UFC):

4-010-01-03(R2007).....DOD Minimum Antiterrorism Standards for Buildings

Q. 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)

R. 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 – GENERAL

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 HEAT-TREATED 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 Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.

2.3 COATED GLASS (NOT USED)

2.4 ELECTROCHROMIC COATED GLASS (NOT USED)

2.5 PLASTIC GLAZING:

A. Clear Polycarbonate Sheet:

1. ASTM C1349, Appendix X1, Type II, (coated mar-resistant, UV-stabilized), with coating on both sides. Flame spread of 10 or less when tested per ASTM E84.
2. Thickness, as scheduled.

2.6 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 scheduled.

C. Interlayer Color: Clear, unless otherwise scheduled.

2.7 SECURITY GLAZING ASSEMBLY:

A. Provide ballistic level as scheduled in accordance with UL 752.

B. Laminated Glass Security Glazing Units: Fabricate from multiple lites of scheduled glass with polyvinyl butyral, ionomeric polymer, or cast-in-place and cured-transparent resin interlayers between the layers of glazing.

2.8 INSULATING GLASS UNITS:

A. Provide factory-fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.

B. Assemble units using glass types specified in Insulating Glass Schedule.

2.9 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 scheduled, 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.

B. Fire-Resistance-Rated Glazing: Glazing units tested for use in fire wall assemblies, UL, ITS-WHI or equivalent listed and labeled by testing agency in accordance with IBC for fire-resistance ratings of wall assemblies as scheduled, based upon testing according to NFPA 252 and ASTM E119 or UL 263.

1. Labeling: Permanently label fire-resistance-rated glazing units in accordance with IBC.
2. Safety Glazing: Comply with 16 CFR 1201, Category II.
3. Fire-Resistance-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.
4. Fire-Resistance-Rated Double Glazing Units with Gel Fill: Units made from two lites of uncoated, fully tempered, ultra-clear (low-iron) float glass, with perimeter metal spacer and edge seal forming cavity filled with clear, fully transparent, heat-absorbing gel, of thickness and fire-protection rating scheduled.

2.10 SWITCHABLE PRIVACY GLASS (NOT USED)

2.11 INSULATING PLASTIC SHEETS (NOT USED)

2.12 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) except 100 to 150 mm (4 to 6 inches) for insulating glass.
   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.
   2. Shape, size, and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
   3. Complying with AAMA 800 for the following types:
      a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
      b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

F. Glazing Gaskets: ASTM C864:
   1. Firm dense wedge shape for locking in sash.
   2. Soft, closed-cell with locking key for sash key.
   3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

G. 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).

H. Color:
1. Color of glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted are to be black, gray, or neutral color.

2.13 INTERIOR WALL GLAZING UNITS WITH INTEGRAL LOUVERS (NOT USED)

2.14 INTERIOR DOOR GLAZING UNITS WITH INTEGRAL LOUVERS (WITH TRIM KIT)

A. Glazing thickness shall be determined by unit manufacturer according to application and sizes of units as indicated on the Drawings.
B. Exterior Lite: 4mm (5/32-inch) thick clear tempered safety glass.
C. Desiccant Air Space between Lites:
1. Hermetically sealed with 25mm (1-inch) aluminum spacer.
2. Containing 4.75mm (3/16-inch) thick by 22mm (7/8-inch) wide manually operated louver blades.

D. Interior Lite: 4mm (5/32-inch) thick clear tempered safety glass.

2.15 FABRICATION OF INTERIOR GLAZING UNITS WITH INTEGRAL LOUVERS

A. Frame Construction: Corrosion-resistant aluminum.
B. Louver Construction: Hollow extruded-aluminum airfoil shape profiled to interlock with adjacent blades; Alloy 6063 and Temper T5.
C. Secure louvers at both ends with molded pivots.
D. Operation: Blades shall be rotatable 180 degrees in a continuous cycle. Louvers shall be operable without cords or strings. Provide manufacturer’s standard, self-reversing black plastic thumbwheel .
2. Door Applications: The axle of the mechanism shall be positioned at 190mm (7-15/32 inches) from the bottom of the panel, on the left or right as directed. Access thumbwheel from corridor side only.

E. Louver Color: Gray metallic.

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 and operable sash, in a securely fixed or closed and locked position, until sealant or glazing compound has thoroughly set.

F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

G. Plastic:

1. Use dry glazing method.
2. Use only neoprene or EPDM gaskets.

H. Laminated Glass:

1. Tape edges to seal interlayer and protect from glazing sealants.
2. Do not use putty or glazing compounds.

I. Insulating Glass Units:

1. Glaze in compliance with glass manufacturer's written instructions.
2. When glazing gaskets are used, they are to be of sufficient size and depth to cover glass seal or metal channel frame completely.

3. Do not use putty or glazing compounds.
4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.

J. Fire-Protective and Fire-Resistive Glass:
1. Glaze in accordance with manufacturer’s installation instructions and NFPA 80.

K. Bullet-Resisting Material:
1. Glaze as recommended by manufacturer, using glazing material which will permit expansion and contraction of the bullet-resistive material in the frame.
2. The polycarbonate surface is not to be cleaned by scraping, razor blade, squeegee, or use of highly alkaline cleaner.
3. At no time shall polycarbonate material be exposed to chemical solvents (benzene, gasoline, acetone, paint thinners) or aromatic hydrocarbons (toluene or xylene), nor should any of these solvents or fumes by used or present in confined area such as a security guard booth.
4. Due care shall be exercised (paint formula, ventilation, protection of polycarbonate) when painting becomes necessary to interiors of rooms of hardline glazed units; exposure to chemical solvents could result in irreparable damage to security glazings (delaminations, distortions, cracks, severe stress crazing, air bubbles, etc.).

3.4 INSTALLATION – ELECTROCHROMIC GLAZING (NOT USED)

3.5 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING):

A. Select this glazing method for aluminum doors unless door manufacture requires otherwise.
B. Cut glazing tape or spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
C. Place setting blocks at 1/4 or 1/3 points with edge block no more than 150 mm (6 inches) from corners.
D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
G. Trim protruding tape edge.

3.6 INSTALLATION - WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Use this system with aluminum windows with glazing beads unless window manufacturer requires otherwise.

B. Cut glazing tape to length and set against permanent stops, 5 mm (3/16 inch) below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 or 1/3 points with edge block no more than 152 mm (6 inches) from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.

G. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line. Sealant type shall be compatible with glazing tape.

H. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 INSTALLATION - WET METHOD (SEALANT AND SEALANT):

A. Use this system with aluminum windows when the window manufacturer does not warrant the previous method.

B. Place setting blocks at 1/4 or 1/3 points and install glazing pane or unit.

C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

D. Fill gaps between glazing and stops with sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.

E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.8 INSTALLATION - EXTERIOR BUTT GLAZED METHOD (SEALANT ONLY) (NOT USED)

3.9 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT):

A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.

B. Place setting blocks at 1/4 or 1/3 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line. Sealant type shall be compatible with glazing tape.

F. Trim protruding tape edge.

3.10 INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND):

A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 600 mm (24 inch) centers, kept 6 mm (1/4 inch) below sight line.

B. Locate and secure glazing pane using spring wire clips.

C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.11 INSTALLATION - REGLAZING HISTORIC FRAMING (NOT USED)

3.12 COMMISSIONING – ELECTROCHROMIC GLAZING (NOT USED)

3.13 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 and setting material in clean, whole, and acceptable condition.

3.14 PROTECTION:

A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on color-anodized finish are not acceptable.

3.15 MONOLITHIC GLASS SCHEDULE:

A. Glass Type MG# A: Clear fully tempered float glass.

1. Unit Thickness: 6 mm (0.23 inch).

2. Safety glazing label required.
3. Application: Interior glazing of units unless otherwise scheduled.

3.16 LAMINATED GLASS SCHEDULE:

A. Glass Type LG# A: Clear laminated glass with two (2) lites of fully tempered float glass.
1. Minimum Thickness of Each Glass Lite: 3 mm (0.12 inch).
2. Interlayer Thickness: 1.52 mm (0.060 inch).
a. Exception for Glass Type LG# A2a (Obscure/Privacy Interior Glazing): Translucent white interlayer. Percentage of translucency shall be selected by COR from manufacturer’s full range.
3. Safety glazing label required.
4. Application: Interior glazing of units.

3.17 INSULATING GLASS SCHEDULE:

A. Not Used.
B. Glass Type IG# B: Low-E-coated, clear insulating glass.
1. Overall Unit Thickness: 25 mm (1 inch).
2. Minimum Thickness of Each Glass Lite: 6 mm (0.23 inch).
3. Outdoor Lite: Annealed float glass, except heat-strengthened float glass where required, and fully tempered float glass where indicated.
4. Interspace Content: Air.
5. Indoor Lite: Fully tempered float glass.
a. Exception for Glass Type IG# B5a (Obscure/Privacy Exterior Glazing): Same description and performance, but with window film having a frosted appearance applied to fourth surface. Percentage of translucency shall be selected by COR from manufacturer’s full range.
6. Low-E Coating: Sputtered on second surface.
7. Visible Light Transmittance: 70 percent minimum.
8. Solar Heat Gain Coefficient: 0.39 maximum.
9. Safety glazing label required.
10. Where indicated, muntins simulating divided lites within each sash will be integral to the insulating glass units (IGUs) – not an accessory to the window frame.

3.18 INSULATING LAMINATED GLASS SCHEDULE (FORCE PROTECTION AND PHYSICAL SAFETY) (NOT USED)

3.19 ELECTROCHROMIC LAMINATED INSULATING GLASS SCHEDULE (NOT USED)

3.20 FIRE-PROTECTIVE AND FIRE-RESISTANCE GLAZING SCHEDULE:

A. Glass Type FR# A: Fire-protection-rated tempered glass [D-20 per IBC Section 716].
   1. Thickness: 6 mm (0.23 inch).
   2. Rating: 20-minute.
   3. Application: Fire-protection-rated door assemblies with openings not over 0.65 sq. m (100 sq. in.) in one-hour smoke barriers between smoke compartments.

B. Glass Type FR# B: Fire-protection-rated laminated ceramic glazing [D-H-45 per IBC Section 716].
   1. Thickness: 3/8 inch.
   2. Rating: 45-minute.
   3. Application: Fire-protection-rated door assemblies in one-hour fire-resistance-rated wall assemblies.

C. Glass Type FR# C: Fire-protection-rated laminated glass with intumescent interlayers [D-H-90 per IBC Section 716].
   1. Thickness: 3/4 inch.
   2. Rating: 90-minute.
   3. Application: Fire-protection-rated door assemblies with openings not over 0.65 sq. m (100 sq. in.) in two-hour fireresistance-rated exit passageway walls.

3.21 SECURITY GLAZING SCHEDULE:

A. Not Used.

B. Not Used.

C. Glass Type SG# C: Clear Tempered Glass Clad Polycarbonate Security Glazing Unit:
   1. Outer Glass Panes: Fully tempered, minimum 3 mm (0.12 inch) thick in thickness required by glazing fabricator to meet performance requirements.
   2. Interlayers: Minimum 1.3 mm (0.050 inch) polyurethane sheeting, in thickness required to meet performance requirements.
   3. Core: Clear polycarbonate sheet, minimum 3 mm (0.12 inch) thick, in thickness required to meet performance requirements.
   4. Ballistic-Resistance Rating: UL 752, Level 3.
   5. Anticipated Minimum Overall Nominal Thicknesses:

a. Single-Slide Automatic Entrance Door Systems: 1 inch.

b. Other Bullet-Resisting Glazed Openings: 1.125 inch.

c. Thickness Tolerance: Plus 0.014 inch and minus 0.21 inch.

D. Glass Type SG# D: Clear Laminated Polycarbonate Sheet:

1. ASTM C1349, Appendix X1, Type II, (coated mar-resistant, UV-stabilized), with coating on both exposed sides. Flame spread of 10 or less when tested per ASTM E84. Construction:

a. Outboard Lite: 3/16-inch-thick clear polycarbonate sheet with abrasion-resistant surface.

b. Interlayer: Urethane.

1) Exception for Glass Type SG# D1b1 (Obscure/Privacy Lite): Same description and performance, but with interlayer having a frosted appearance. Percentage of translucency shall be selected by COR from manufacturer’s full range.

c. Inboard Lite: 3/16-inch-thick clear polycarbonate sheet with abrasion-resistant surface.

2. Average Thickness 0.375 inch.

a. Tolerance: Plus 0.043 inch or minus 0.035 inch).

3. Weight: 2.3 pounds per square foot.

4. Visible Light Transmission (ASTM D1003): 78 percent.

5. Glazing Method: Compatible sealant or gasket as recommended by glazing manufacturer.

a. Do not use PVC gasket material.

b. Do not use setting blocks made from PVC, EPDM, or neoprene rubber materials.

3.22 INTEGRAL LOUVER GLAZING SCHEDULE

A. Glass Type IL# A: Clear double-glazed unit with integral louvers and tempered glass.

1. Overall Thickness of Units in Door Leaves: 33.3mm (1-5/16 inch).

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SECTION 08 87 33
DECORATIVE FILMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Window films applied for decorative purposes.

1.02 RELATED REQUIREMENTS

A. Section 08 80 00 - Glazing:
   1. Interlayer for laminated glass.

1.04 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Deutsches Institut für Normung e.V. (German Institute for Standardization – or DIN):
   1. DIN 30646 - Self Adhesive Signs (Labels); Technical Conditions of Delivery for Plates Made of Synthetic; Aluminium Foil and Paper.

C. FINAT Test Methods (FTMs):
   1. FTM-1 - Peel Adhesion (180 Degrees) at 300mm per Minute.
   2. FTM-9 - Loop Tack Measurement.
   3. FTM-14 - Dimensional Stability.

D. International Organization for Standardization (ISO):
   1. ISO 527-1 - Plastics - Determination of Tensile Properties - Part 1: General Principles.
   2. ISO 534 - Paper and Board - Determination of Thickness, Density, and Specific Volume.
   3. ISO 2813 - Paints and Varnishes - Determination of Specular Gloss of Non-Metallic Paint Films at 20 Degrees, 60 Degrees, and 85 Degrees.
   4. ISO 4892-2 - Plastics - Methods of Exposure to Laboratory Light Sources - Part 2: Xenon-Arc Lamps.

1.05 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWNGS, PRODUCT DATA, AND SAMPLES, for submittal procedures.

B. Product Data: Provide manufacturer's literature, marked up to identify proposed material(s) and application(s).

C. Shop Drawings: Indicate location(s) and arrangement of graphics and frost effect.

D. Test Reports: Indicate compliance with specified physical properties.

E. Manufacturer's Instructions: Furnish current instructions and recommendations for installing specified decorative film(s).

1.06 DELIVERY, STORAGE, AND HANDLING

A. During transportation and storage, do not expose decorative film to extreme temperature and humidity changes.

1.07 FIELD CONDITIONS

A. Only install decorative film when substrate and ambient temperatures are 50 degrees Fahrenheit and rising.

PART 2 - PRODUCTS

2.01 DECORATIVE WINDOW FILM(S)

A. Sole-Source Responsibility: Furnish decorative film(s) that is/are the product(s) of a single manufacturer and obtained from a single supplier.

B. Manufacturer and Supplier: Manufactured by Morgan Adhesives Company, dba MACtac UK, the commercial subsidiary of MACtac Europe, a BEMIS company; Transparent Print Media and Printable Film with Frosted Effect: www.mactac-creative.eu -- and marketed by Eykon Design Resources; Imagination ARC and Frost Window Films: www.eykon.net.

C. VF-2 – Custom Digitally Printed Decorative Film ("ARC"): Gloss clear polymeric polyvinyl-chloride (PVC) film with air-release channels.
   1. Thickness: 0.0031 inch (3.1 mils).
   2. Adhesive: Re-positionable, micro-structured, permanent, pressure-sensitive, clear acrylic.
      a. Adhesive shall allow dry installation on glass surfaces.
         1) Products that rely on wet components for installation will not be acceptable.
      b. Adhesive shall bond well yet is easily and completely removable.
   3. Liner: 80-pound poly-coated lay-flat liner.
   4. Physical Properties: Custom digitally printed decorative film shall have the following laboratory test values.

Physical Property	Typical Value	Reference Standard
Peel Adhesion	Between 3.1 and 3.7 pounds per inch	FTM-1 (180 degrees after 24 hours on stainless steel)
Quick Tack	Between 4.4 and 5.6 pounds per square inch	FTM-9 (on stainless steel)
Dimensional Stability	0.2 percent (maximum)	FTM-14 (10- by 10-inch sample bonded to aluminum)
Service Temperature Range	Between negative 40 and positive 194 degrees Fahrenheit	Testing Protocol Defined by Manufacturer of Decorative Film

Surface-Burning Characteristics*	Interior Finish Class A Interior Finish Class 1	Section 803.1 of IBC and Section 10.2.3.4 of NFPA 101 UBC Standard 8-1
Flame Spread Index	5	ASTM E84
Smoke-Developed Index	20	ASTM E84

*Materials having a thickness less than 0.36 inch applied directly to a vertical surface are not subject to interior finish requirements in the International Building Code (IBC) per IBC Section 803.2 ("Thickness Exemption").

5. Product shall be designed for:
   a. Indoor window graphics with a durability of between five and seven years.
   b. Wide-format inkjet printing with solvent-based inks that cure under ultraviolet radiation.
      1) Print environments and the individual nature of printing systems, inks, and software can all significantly affect output. Ensure that only the correct International Color Consortium (ICC) profiles or printer settings are used.
      2) Download profiles from one of the following:
         (a) Authorized distributor of decorative film.
         (b) www.MACtac.com.
         (c) O.E.M. or software manufacturers' websites.
      3) Do not roll up printed media until ink has dried.
      4) Opacity of white frosted pattern: 15 percent.
6. After inks have dried, overlaminate the inkjet-printed material with the decorative-film manufacturer's overlaminates to maximize resistance to color fading.
7. Test combinations of decorative film, inks, and overlaminates prior to printing final product.
8. To allow for ease of transportation, custom digitally printed decorative film may be rolled up under the following conditions:
   a. Image shall be facing out.
   b. Interior diameter of roll shall not be less than 6 inches.

D. VF-1 and VF-3 – Translucent Decorative Film ("Frost"): Window film with pressure-sensitive adhesive that bonds well yet is easily and completely removable.
   1. Physical Properties: Translucent decorative film ("Frost") shall have the following laboratory test values.

Physical Property	Reference Standard	Typical Value
Thickness of Face Film	ISO 534	50 micron
Thickness of Face Film with Adhesive	ISO 534	80 micron
Dimensional Stability	DIN 30646	0.2 mm (maximum)
Tensile Strength	ISO 527-1	22 Newtons per square mm
Elongation	ISO 527-1	25 Percent
Gloss	ISO 2813, 20 degrees	50 Percent
Light Transmission	Testing Protocol Defined by Manufacturer of Decorative Film	66 Percent
Adhesion (Initial)	FTM-1 (on stainless steel)	540 Newtons per meter
Adhesion (Ultimate)	FTM-1 (on stainless steel)	720 Newtons per meter
Flammability	Testing Protocol Defined by Manufacturer of Decorative Film	Self-Extinguishing
Accelerated Aging	ISO 4892-2	No Negative Impact (after 1500 hours of exposure)

Resistance to Humidity (after 200 hours of exposure)	Testing Protocol Defined by Manufacturer of Decorative Film	No Effect
Resistance to Corrosion (after 120 hours of exposure)	Testing Protocol Defined by Manufacturer of Decorative Film	No Effect
Resistance to Sea Water (after 48 hours of immersion)	Testing Protocol Defined by Manufacturer of Decorative Film	No Effect

2. Product shall be designed:
   a. To provide a visual frosted effect without etching and harsh chemicals.
   b. For interior application to glass surfaces.
   c. For seven-year service life on the interior surface of exterior windows.
   d. For 15-year service life on interior borrowed lites, sidelites, and transoms.
3. Opacity:
   a. VF-1: 15 percent.
   b. VF-3: 75 percent.

2.02 ACCESSORIES

A. Cleaner: Windex, Glass Plus, or another comparable off-the-shelf glass cleaner.

PART 3 - EXECUTION

3.01 APPLICATION

A. Apply in strict accordance with the instructions of the decorative-film manufacturer.
   1. This product is designed to be applied without the use of application fluids.
      a. Do not use a wet application method for installation.
   2. Remove between 1 and 2 inches of the liner from one edge of the graphic.
   3. Carefully position the graphic onto the window, lining up all of the edges.
   4. When positioned correctly, tack it down using the exposed portion of the adhesive. Using a squeegee with a soft sleeve -- or a felt squeegee -- apply even pressure to the decorative film, working out from the center of the graphic.
      a. Do not use a hard squeegee.

b. Applied pressure shall be firm -- but relatively light -- due to the nature of the "air-egress" adhesive in combination with the clear film.
   1) Practice first using surplus materials on independent substrates similar to those used on this Project until familiar with the touch needed for a successful application.

5. Remove the remaining liner and use the squeegee to apply the remainder of the graphic to the window with short, overlapping strokes, again from the center out.
6. Once the entire graphic is applied:
   a. Go back and trim off unneeded margins.
   b. Re-burnish edges to ensure good contact with the window surface.
7. At acceptance, installed film shall be without wrinkles or air pockets.

3.02 CLEANING

A. Use clean, soft lint-free cloths.

B. Spray cleaner into cloth - not onto decorative film. Do not over-saturate.

C. Wipe down image with the cloth.
   1. Caution: If edges are not sealed, do not allow cleaner to come into contact with the edges.

D. Immediately dry with a clean soft dry cloth.

- - - END - - -

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, and 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, and Section 09 67 23 60, RESINOUS (Urethane and Epoxy Mortar) FLOORING.

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 (Not suitable for resinous floor finishes)

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, resilient sheet flooring, and resilient tile flooring 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 inch, per application. Applications greater than 1 inch require

additional 3/8-inch 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 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

2.3 CEMENTITIOUS TROWEL-APPLIED UNDERLAYMENT (NOT SUITABLE FOR RESINOUS FLOOR FINISHES)

A. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

B. Compressive Strength: Minimum 4000 psi in 28 days

C. Trowel-applied underlayment shall not contain silica quartz (sand).

D. Dry Time: Underlayment shall receive the application of floor covering in 15-20 minutes.

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 to 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:

Location: SALEM, VA

Project No. and Name: CONSOLIDATE INTENSIVE CARE UNIT

Submission 95% CONSTRUCTION DOCUMENTS

Date: FEBRUARY 11, 2019

SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I – GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer’s trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer’s equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this Section.

1. DIGITAL COLOR PHOTOS-INTERIOR VIEWS:

Room Number and Name	Item/View to be Photographed
1.	
2.	
3.	
4.	

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 DIGITAL COLOR PHOTOS

A. Size 24 x 35 mm.

B. Labeled for:

1. Building name and Number.
2. Room Name and Number.

2.2 DIVISION 31 – EARTHWORK (NOT USED)

2.3 DIVISION 03 – CONCRETE

A. SECTION 03 30 00, CAST IN PLACE CONCRETE

Surface	Finish Description
Floor Slabs	Specified Flatness and Levelness Tolerances

2.4 DIVISON 04 – MASONRY

A. Section 04 05 13, MASONRY MORTARING and Section 04 05 16, MASONRY GROUTING

Finish Code	Manufacturer	Mfg. Color Name
All masonry mortaring	Flamingo	Match existing mortar on adjoining exterior walls, reportedly C73 mixed with “Lite Castle” sand

B. Section 04 20 00, UNIT MASONRY

1. FACE BRICK (FB)

Finish Code	Size	Pattern	Manufacturer	Mfg. Color Name/No.
All	Match dimensions of existing masonry units on adjoining exterior walls	Flemish Bond	Old Virginia	Match blend of existing masonry units on adjoining exterior walls, reportedly #24 red with frog inset and 10-percent black manganese brick

C. STONE FACING

Name of Stone	Color, Texture, Finish	Stone Source
All	Match existing	Match existing

2.5 DIVISION 05 – METALS

A. SECTION 05 50 00, METAL FABRICATION

Item	Finish
Loose Lintels	Non-quenched hot-dip galvanized steel with duplicate coating of paint to match color of adjoining masonry (whether face brick or stone)
Steel Ladders	Non-quenched hot-dip galvanized steel with duplicate coating of paint to match color of adjoining face brick
Steel Pipe Railings (not on Steel Stairs)	Non-quenched hot-dip galvanized steel with duplicate coating of paint in color selected by COR

B. SECTION 05 51 00, METAL STAIRS

Component	Finish	Color
Newel Posts	Field paint	As selected by COR
Guard Rails	Field paint	As selected by COR
Handrails	Field paint	As selected by COR
Stringers	Field paint	As selected by COR
Risers	Field paint	As selected by COR
Underside	Field paint (if exposed)	As selected by COR

2.6 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

1. NURSES STATION STAFF SIDE (OWNER PROVIDED MODULAR CASEWORK. BASIS OF DESIGN: HERMAN MILLER.. BASIS OF DESIGN: HERMAN MILLER. EXCEPTION: HANDWASH SINK)

Room No. and Name	Component	Material	Finish/Color
6053 6047 6042	Vertical Surface(s)	PLASTIC LAMINATE	TO MATCH PLAM-1
	Tackable Wall Covering		
	Shelving		
	Trim		
	Drawers		
	Misc. Items		
	Base	RESILIENT BASE	RB-2

2. NURSES STATION - PATIENT SIDE (OWNER PROVIDED MODULAR CASEWORK. BASIS OF DESIGN: HERMAN MILLER ETHOSPACE.)

Room No. and Name.	Component	Material	Finish
6053 6047 6042	Transaction Countertop	SOLID SURFACE	TO MATCH SSM-2
	Vertical Surface(s)	PLASTIC LAMINATE	TO MATCH PLAM-1
	Trim		
	Reveal		
	Handrail		
	Bumper Guard		
	Base	RESILIENT BASE	RB-2

2A. NURSE STATION (DECENTRALIZED)

6060, 6061, 6059 6507, 6063	COUNTERTOP BACK WALL	SOLID SURFACE FABRIC WRAPPED PANEL	SSM-2 FWP-1

3. VANITIES (TYPES S4, S4 M)

Room No. and Name	Component	Finish/Color
PATIENT AND STAFF TLT HANDWASH SINK	Countertop	SSM-2
	Trim/PANELING	PLAM-1

4. PATIENT ROOMS - (OWNER PROVIDED MODULAR CASEWORK. BASIS OF DESIGN: HERMAN MILLER COMPASS.)

Room No. and Name.	Component	Material	Finish
Patient Rooms: 6032,6033,6014,6001,6002, 6003,6004,6005,6006,6007 6008,6009,6010,6011, 6012, 6013, 6056	COUNTERTOP	SOLID SURFACE	TO MATCH SSM-2
	Vertical Surface(s)	PLASTIC LAMINATE	TO MATCH PLAM-1
	Base	SCHEDULED ROOM BASE	WSSV-2

5. SUPPORT SPACES - (OWNER PROVIDED MODULAR CASEWORK. BASIS OF DESIGN: HERMAN MILLER MORA.)

Room No. and Name.	Component	Material	Finish
Soiled:6028, Meds:6054,6055, Nourish: 6015, Hospitalist: 6041, On Call: 6031, Staff Break: 6021, Staff Training: 6025,	COUNTERTOP	SOLID SURFACE	TO MATCH SSM-2

2.7 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. POLYVINYL-CHLORIDE ROOFING (07 54 19)

Size	Material	Color	Manufacturer	Mfg. Color Name/No.
60-Mil	PVC	White	JM	

B. SECTION 07 71 00 / 07 72 00, ROOF SPECIALITIES AND ACCESSORIES

Item	Material	Finish	Manufacturer	Manufacturer/Color Name/Number.
Roof Hatch	Aluminum	Mill	Bilco	F50TB
Copings	Extruded Aluminum	Color as selected by COR	OMG (fka Hickman)	Permasnap 2 Plus

C. SECTION 07 92 00, JOINT SEALANTS

Location	Color	Manufacturer	Manufacturer Color
Masonry Expansion Joints	As selected by COR	Various	N/A
New to Existing Walls	As selected by COR	Various	N/A
Building Expansion Joints	As selected by COR	Various	N/A
Masonry Sealed Joints	As selected by COR	Various	N/A
Stone Sealed Joints	As selected by COR	Various	N/A

2.8 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Door	As selected by COR in semi-gloss sheen
Frame	As selected by COR in semi-gloss sheen
Window frame	As selected by COR in semi-gloss sheen

B. SECTION 08 14 00, WOOD DOORS

Component	Finish/Color
Doors	STAINED TO MATCH PLAM-1
Frames	PS-6

C. SECTION 08 31 13, ACCESS DOORS AND FRAMES

Material	Finish/Color
Steel	Field-paint in color as selected by COR to match adjoining finish

D. SECTION 08 51 13, ALUMINUM WINDOWS

Type	Finish	Glazing	Manufacturer	Mfg. Color Name/No.
Fixed	Factory 70-percent PVDF in color as selected by COR to match adjoining windows in existing building	1-Inch-Thick IGU	Various	Match adjoining windows in existing building

E. WINDOW SILLS

Room No. and Name	Material	Finish
All	Aluminum Subsill (With Windows)	Factory 70-percent PVDF in color to match new window
All	SECTION 04 72 00, CAST STONE MASONRY	Color as selected by COR to match adjoining stone on existing building

F. WINDOW STOOLS

Room No. and Name	Material	Finish
All	Solid Surface Material	SSM-2

2.9 DIVISION 09 - FINISHES

A. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
ACT-1	Exposed Suspension System	WHITE	ARMSTRONG	ULTIMA SQUARE LAY-IN 24″X24″ GRID: PRELUDE XL, 15/16″
ACT-2		WHITE	ARMSTRONG	HEALTHZONE ULTIMA, SQUARE LAY-IN 24″X24″ GRID: PRELUDE XL, 15/16″

B. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
LVT-1	6″X36″	LVT	GERFLOR	CREATION/WOOD/0097 TEAK
LVT-2	6″X36″	LVT	GERFLOR	CREATION/WOOD/0556 CLIFTON
LVT-3	18″X18″	LVT	GERFLOR	CREATION/WOOD/0123 FOSSIL

C. SECTION 09 65 16, VINYL SHEET FLOORING, HEAT WELDED SEAMS (WSF)

Finish Code	Pattern name	Manufacturer	Mfg. Color Name/No.
WSSV-1	REALITIES II	MANNINGTON COMMERCIAL	BOARDWALK/NETTLE 5669R
WSSV-2	MELODIA	JOHNSONITE	BEACHSIDE

C1. SECTION 09 65 16, WELDING RODS (WSF)

Finish code	Manufacturer	Mfg. Color Name/No.
TO MATCH ADJACENT FLOORING		

D. SECTION 09 65 13, RESILIENT BASE STAIR TREADS AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
	Resilient Base (RB)	RB-1 4”h	JOHNSONITE	COVE BASE, 80 FAWN
		RB-2 4.25”H	JOHNSONITE	PERCEPTIONS, RECESS ANGLED TOE 80 FAWN
	Resilient Stair Treads (RST)			RUBBER TREAD WITH INTEGRATED RISER STYLE: VIBMTR - BAMBOO TREA/RISER VS. IMPAIRED COLOR: 80/FAWN CONTRAST INSERT: 49/BEIGE

E. SECTION 09 67 23, FLUID APPLIED FLOORING

Finish code	Manufacturer	Mfg. Color Name/No.
FAF	STONEHARD	STONETEX, IVORY CREST

F. 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 code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1		SHERWIN WILLIAMS	NEUTRAL GROUND/SW7568
P-2		SHERWIN WILLIAMS	CEILING BRIGHT WHITE/SW7007
P-3		SHERWIN WILLIAMS	COMFORT GRAY/SW6205
P-4		SHERWIN WILLIAMS	MAGNETIC GRAY/SW7058
P-5		SHERWIN WILLIAMS	SMOKEHOUSE/SW7040
P-6		SHERWIN WILLIAMS	VIRTUAL TAUPE/SW7039
3. Clear coatings Code(CC)	Gloss	Manufacturer	Mfg. Color Name/No.
CC		WOLF GORDON	RAMPART SHIFT

2.10 DIVISION 10 - SPECIALTIES

A. SECTION 10 21 23, HOSPITAL CUBILCE CURTAINS AND INTRAVENOUS SUPPORT TRACKS

Finish Code	Manufacturer	Mfg. Color Name/No.

CC-1	MAHARAM	SWAY 511496 WASHED

B. SECTION 10 26 00, WALL GUARDS AND CORNER GUARDS

Item	Material	Manufacturer	Mfg. Color Name/No.
Corner Guards (CG-1)	RESILIENT	INPRO	160 SURFACE MOUNTED, SAND DUNE 0278, 2″
Corner Guards (CG-2)	RESILIENT	INPRO	TAPE ON CORNER GUARD, SAND DUNE 0278, ¾″
Wall Guards and Handrail (HR-1)	RESILIENT	INPRO	3500 SERIES, SAND DUNE 0278/FAUX WOOD PATTERN HANDRAIL W/OVAL PROFILE, 4″H
Wall Guard (CR-1)			1400 WALL GUARD, SAND DUNE 0278, 4″H
Wall Guard (CR-2)	RESILIENT	INPRO	1400 WALL GUARD, SAND DUNE 0278, 8″H

C. SECTION 10 13 00 / 10 14 00, INTERIOR SIGNS

Sign Type	Component	Manufacturer	Mfg. Color Name/No.
S-1	ROOM NUMBER	CREATIVE SIGNAGE	
S-2	ROOM NAME AND NUMBER	CREATIVE SIGNAGE	
S-3	ROOM SIGN W/ SLIDERS	CREATIVE SIGNAGE	
S-4	CONFERENCE/MEETING	CREATIVE SIGNAGE	
S-5	RESTROOM SIGN	CREATIVE SIGNAGE	
S-6	EVACUATION PLAN	CREATIVE SIGNAGE	
S-7	FIRE EXTINGUISHER	CREATIVE SIGNAGE	
S-8	RACE SIGN	CREATIVE SIGNAGE	
S-9	HAZARDOUS MATERIALS	CREATIVE SIGNAGE	

D. SECTION 10 28 00, TOILET AND BATH ACCESSORIES

Item	Material	Manufacturer	Mfg. Color Name/No.
SOAP DISPENSER			JSN5075
PAPER TOWEL DISPENSER			JSN5080
SHARPS			JSNA5108

2.11 DIVISION II – EQUIPMENT (NOT USED)

2.12 DIVISION 12- FURNISHINGS

A. SECTION 12 36 00, COUNTERTOPS AND ACCESSORIES

Type	Finish/Color
Methyl Methacrylate (Solid-Surface Material)	SSM-2

B. SECTION 12 24 00, WINDOW SHADES

Component	Material	Manufacturer	Mfg. Color Name/No.
Shade Cloth			

PART III EXECUTION

3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Access Flooring	AF
Accordion Folding Partition	AFP
Acoustical Ceiling	AT
Acoustical Ceiling, Special Faced	AT (SP)
Acoustical Metal Pan Ceiling	AMP
Acoustical Wall Panel	AWP
Acoustical Wall Treatment	AWT
Acoustical Wallcovering	AWF
Anodized Aluminum Colored	AAC
Anodized Aluminum Natural Finish	AA
Baked On Enamel	BE
Brick Face	BR
Brick Flooring	BF
Brick Paving	BP
Carpet	CP
Carpet Athletic Flooring	CAF
Carpet Module Tile	CPT
Ceramic Glazed Facing Brick	CGFB
Ceramic Mosaic Tile	FTCT
Concrete	C
Concrete Masonry Unit	CMU
Divider Strips Marble	DS MB
Epoxy Coating	EC
Epoxy Resin Flooring	ERF
Existing	E
Exposed Divider Strips	EXP
Exterior	EXT
Exterior Finish System	EFS
Exterior Paint	EXT-P
Exterior Stain	EXT-ST
Fabric Wallcovering	WF
Facing Tile	SCT
Feature Strips	FS
Floor Mats & Frames	FM
Floor Tile, Mosaic	FT
Fluorocarbon	FC
Folding Panel Partition	FP
Foot Grille	FG
Glass Masonry Unit	GUMU
Glazed Face CMU	GCMU
Glazed Structural Facing Tile	SFTU
Granite	GT
Gypsum Wallboard	GWB
High Glazed Coating	SC
Latex Mastic Flooring	LM
Linear Metal Ceiling	LMC
Linear Wood Ceiling	LWC
Marble	MB
Material	MAT
Mortar	M
Multi-Color Coating	MC
Natural Finish	NF
Paint	P
Paver Tile	PVT
Perforated Metal Facing (Tile or Panels)	PMF
Plaster	PL

Plaster High Strength	HSPL
Plaster Keene Cement	KC
Plastic Laminate	PLAM
Polypropylene Fabric Wallcovering	PFW
Porcelain Paver Tile	PPT
Quarry Tile	QT
Radiant Ceiling Panel System	RCP
Resilient Stair Tread	RST
Rubber Base	RB
Rubber Tile Flooring	RT
Spandrel Glass	SLG
Stain	ST
Stone Flooring	SF
Structural Clay	SC
Suspension Decorative Grids Grids	SDG

Terrazzo Portland Cement	PCT
Terrazzo Tile	TT
Terrazzo, Thin Set	
Textured Gypsum Ceiling Panel	TGC
Textured Metal Ceiling Panel	TMC
Thin set Terrazzo	TST
Veneer Plaster	VP
Vinyl Base	VB
Vinyl Coated Fabric Wallcovering	W
Vinyl Composition Tile	VCT
Vinyl Sheet Flooring	VSF
Vinyl Sheet Flooring (Welded Seams)	WSF
Wall Border	WB
Wood	WD

3.2 FINISH SCHEDULE SYMBOLS

Symbol	Definition
**	Same finish as adjoining walls
-	No color required
E	Existing
XX	To match existing
EFTR	Existing finish to remain
RM	Remove

3.3 ROOM FINISH SCHEDULE

A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

B. ROOM FINISH SCHEDULE

Room No. and Name		FLOOR		BASE		WALL		WAINSCOT		CEILING		REMARKS
				MAT	FCC	MAT	FCC	MAT	FC	MAT	FCC	
ICU 4 6001	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1				
			E	WSSV-2		PE-1						
			S	WSSV-2		IWC-1						
			W	WSSV-2		PE-1						
			C									
ICU 5 6002	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1				
			E	WSSV-2		PE-1						
			S	WSSV-2		IWC-1						
			W	WSSV-2		PE-1						
			C									
ICU 6 6003	NEW	WSSV-1/ WSSV-2	N	WSSV-2		IWC-1		HIP-1				
			E	WSSV-2		PE-1						
			S	WSSV-2		PE-1						
			W	WSSV-2		PE-1						
			C									

BARI. ICU 7 6004	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		PE-4				
			C							
ICU 8 6005	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		IWC-1				
			C							
ICU 9 6006	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		IWC-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		PE-1				
			C							

ICU 10 6007	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		IWC-1				
			C							
ICU 11 6008	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		IWC-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		PE-1				
			C							

ICU 12 6009	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		IWC-1				
			C							
ICU 13 6010	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		IWC-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		PE-1				
			C							
ICU 14 6011	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PEP-4		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
ICU 15 6012	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PEP-1		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-4				
			W	WSSV-2		PEP-1				
			C							
ICU 16 6013	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PEP-4		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							

ADA ICU 3 6014	NEW	WSSV-1/ WSSV-2	N	WSSV-2		IWC-1				
			E	WSSV-2		PE-1				
			S	WSSV-2		PE-1				
			W	WSSV-2		PE-1				
			C							
NOURISH 6015	EXIST	WSSV-2	N	RB-1		PE-1				
			E	RB-1		PE-1				
			S	RB-1		PE-1				
			W	RB-1		PE-1				
			C							
MEDS 6016	NEW	WSSV-2	N	RB-1		PE-1		HIP-1		
			E	RB-1		PE-1				
			S	RB-1		PE-1				
			W	RB-1		PE-1				
			C							
DATA 6017	EXIST	SDS-1	N	SDS-1						
			E	SDS-1						
			S	SDS-1						
			W	SDS-1						
			C							
ELECTR. 6018	NEW	SDS-1	N	SDS-1						
			E	SDS-1						
			S	SDS-1						
			W	SDS-1						

ANTE 6019	EXIST	WSSV-2	N	WSSV-2		PEP-1		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
ANTE 6020	NEW	WSSV-2	N	WSSV-2		PEP-1		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
STAFF BREAK 6021	EXIST	LVT-2	N	RB-2		PE-1				
			E	RB-2		PE-1				
			S	RB-2		PE-1				
			W	RB-2		PE-1				
			C							
CLEAN SUPPLY 6022	NEW	WSSV-2	N	WSSV-2		PEP-1		HIP-1		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
TOILET 6023	EXIST	RES-1	N			PS-3		SSM-1		
			E			PS-3				
			S			PS-3				
			W			PS-3				

STAFF TRAINING 6025	N E W	LVT-2	N					N/A		
			E							
			S							
			W							
			C							

SOILED 6028	N E W	WSSV-2	N	WSSV-2		PEP-1		HIP-1		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
ON CALL TLT/ SHOWER 6030	N E W	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
ON CALL 6031	N E W	LVT-2	N	RB-2		PE-4		N/A		
			E	RB-2		PE-4				
			S	RB-2		PE-4				
			W	RB-2		PE-4				
			C							

ICU 1 6032	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		IWC-1				
			W	WSSV-2		PE-1				
			C							
ADA ICU 2 6033	N E W	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-1				
			S	WSSV-2		IWC-1				
			W	WSSV-2		PE-1				
			C							
CONSULT 6035	N E W	LVT-2	N	RB-2		PE-3		N/A		
			E	RB-2		PE-3				
			S	RB-2		PE-3				
			W	RB-2		PE-3				
OFFICE 6039	N E W	LVT-2	N	RB-2		PE-4		N/A		
			E	RB-2		PE-4				
			S	RB-2		PE-4				
			W	RB-2		PE-4				
			C							
OFFICE 6040	N E W	LVT-2	N	RB-2		PE-4		N/A		
			E	RB-2		PE-4				
			S	RB-2		PE-4				
			W	RB-2		PE-4				
			C							

HSPT/ PYSICIAN 6041	NEW	LVT-2	N	RB-2		PE-4		N/A		
			E	RB-2		PE-4				
			S	RB-2		PE-4				
			W	RB-2		PE-4				
			C							
NURSE STATION 6042	NEW	LVT-3	N	RB-2		N/A		HIP-1		
			E	RB-2		N/A				
			S	RB-2		N/A				
			W	RB-2		PE-6				
			C							
TLT 6043	NEW	RES-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6044	NEW	RES-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6045	EXIST	RES-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							

TLT 6046	NEW	RES-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
NURSE STATION 6047	EXIST	LVT-3	N	RB-2						
			E	RB-2		PE-6				
			S	RB-2						
			W	RB-2						
ALCOVE/ CRASH 6048	NEW		N	RB-2		PE-6		HIP-1		
			E	RB-2						
			S	RB-2						
			W	RB-2						
			C							
ALCOVE/ CRASH 6049	EXIST		N	RB-2		PE-6		HIP-1		
			E	RB-2						
			S	RB-2						
			W	RB-2						
			C							
HAC 6052	NEW	WSSV-2	N	WSSV-2		PEP-1		FRL-1		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							

NURSE STATION 6053	EXIST	LVT-3	N	RB-2				HIP-1		
			E	RB-2		PE-6				
			S	RB-2		PE-1				
			W	RB-2						
			C							
MEDS 6054	NEW	WSSV-2	N	RB-1		PE-1		HIP-1		
			E	RB-1		PE-1				
			S	RB-1		PE-1				
			W	RB-1		PE-1				
			C							
CLEAN SUPPLY 6055	EXIST	WSSV-2	N	WSSV-2		PEP-1		HIP-1		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							
ICU 17 6056	NEW	WSSV-1/ WSSV-2	N	WSSV-2		PE-1		HIP-1		
			E	WSSV-2		PE-4				
			S	WSSV-2		PE-1				
			W	WSSV-2		IWC-1				
			C							
ANTE 6058	NEW	WSSV-2	N	WSSV-2		PEP-1		N/A		
			E	WSSV-2		PEP-1				
			S	WSSV-2		PEP-1				
			W	WSSV-2		PEP-1				
			C							

ALCOVE 6029	NEW	LVT-3	N	RB-2		PE-1		HIP-1		
			E	RB-2		PE-1				
			S	RB-2		N/A				
			W	RB-2						
			C							
ALCOVE 6060	NEW	LVT-3	N	RB-2		PE-3		HIP-1		
			E	RB-2		N/A				
			S	RB-2		PE-3				
			W	RB-2		PE-3				
			C							
ALCOVE 6061	NEW	LVT-3	N	RB-2		PE-3		HIP-1		
			E	RB-2		N/A				
			S	RB-2		PE-3				
			W	RB-2		PE-3				
			C							
ALCOVE 6063	EXIST	LVT-3	N	RB-2		PE-3		HIP-1		
			E	RB-2		PE-3				
			S	RB-2		N/A				
			W	RB-2		PE-3				
			C							
TLT 6064	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							

TLT 6065	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6066	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6067	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6068	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6069	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							

TLT 6070	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6071	EXIST	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6072	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6073	EXIST	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6074	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							

TLT 6075	EXIST	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6076	NEW	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
TLT 6077	EXIST	FAF-1	N	FAF-1		PS-3		SSM-1		
			E	FAF-1		PS-3				
			S	FAF-1		PS-3				
			W	FAF-1		PS-3				
			C							
STAIR 6079	NEW		N			PS-1				
			E			PS-1				
			S			PS-1				
			W			PS-1				
			C							
EQUIP. 6081	NEW	WSSV-2	N	RB-1		PE-1		HIP-1		
			E	RB-1		PE-1				
			S	RB-1		PE-1				
			W	RB-1		PE-1				
			C							

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, 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 panels: Section 09 51 00, ACOUSTICAL CEILINGS and Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841, and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.

C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Studs, runners, and accessories.
2. Hanger inserts.
3. Channels (rolled steel).
4. Furring channels.
5. Screws, clips, and other fasteners.

C. Shop Drawings:

1. Typical ceiling suspension system.
2. Typical metal stud and furring construction system including details around openings and corner details.
3. Typical shaft wall assembly

4. Typical fire-resistance rated assembly and column fireproofing showing details of construction same as that used in fire-resistance-rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

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

B. ASTM International

A123/A123M.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A641/A641M-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/C635M-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636/C636M-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-09.....Non-Structural Steel Framing Members

C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....Installation of Interior Lathing and Furring

C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

E580/E580M-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

A. Galvanize steel studs, runners (track), and rigid (hat section) furring channels, with coating designation of G40 per ASTM A123/A123M, or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes as shown.
   1. Use ASTM C645 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 C645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use ASTM C645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).

B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.

C. Doubled studs for openings and studs for supporting concrete backer-board.

D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

E. Shaft Wall Framing:
   1. Conform to rated wall construction.
   2. C-H Studs or C-T Studs.
   3. E Studs.
   4. J Runners.
   5. Steel Jamb-Strut.

2.3 FURRING CHANNELS

A. Rigid Furring Channels (Hat Shape): ASTM C645.

B. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. For fire–resistance-rated construction: Type and size same as used in fire–resistance-rating test.

C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.

F. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

G. Attachments for Wall Furring:

1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
2. For Masonry Walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.

H. Power-Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

A. Pre-engineered, direct-hung system conforming to ASTM C635/C635M, heavy duty (HD), with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire–resistance-rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire–resistance-rating test.

B. Construction requirements for fire–resistance-rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 610 mm (24 inches) on center.

C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.

D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.

E. Extend studs to underside of structure overhead for fire-resistance-rated partitions, smoke partitions, shafts, and sound-rated partitions.

F. Openings:

1. Frame jambs of openings in stud partitions and furring with two studs placed back-to-back or as shown.
2. Fasten back-to-back studs together with 9 mm (3/8-inch) long Type-S pan head screws at not less than 600 mm (2 feet) on center, staggered along webs.
3. Studs fastened flange-to-flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.

G. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

H. Chase Wall Partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
2. Use studs or runners as cross bracing not less than 63 mm (2-1/2-inches wide).

I. Form building seismic or expansion joints with double studs back-to-back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.

J. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall furring-Stud System:

1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

C. Direct attachment to masonry or concrete; rigid channels:
1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
2. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
3. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
4. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
5. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions.

D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.

B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.
1. Install continuous galvanized metal strapping with a minimum uncoated thickness of 0.0635 inch (fka 16 gage) and a width of 6 inches for handrails, grab bars, and other accessories, fixtures, brackets, and miscellaneous specialties, as well as VA-furnished and Contractor-installed items, unless otherwise noted.

2. Provide galvanized metal strapping provided between studs in walls receiving cabinets, TVs, and display monitors (for installation). Blocking for TVs and display monitors shall be metal strapping with a minimum uncoated thickness of 0.0635 inch (fka 16 gage). See the elevations on the Drawings for the centerline above the finished floor.

3.5 INSTALLING SHAFT WALL SYSTEM

A. Conform to UL Design No. U438 for two-hour fire rating.

B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power-driven fasteners at both ends and 600 mm (24 inches) on center.

C. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.

D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.

E. Suitably frame all openings to maintain structural support for wall:

1. Provide necessary liner fillers and shims to conform to label frame requirements.
2. Frame openings cut within a liner panel with E studs around perimeter.
3. Frame openings with vertical E studs at jambs, and with horizontal J runner at head and sill.

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.

1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.

B. Where beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

C. Existing concrete on steel decking:

1. Use power-actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
2. Install fasteners at approximate mid height of concrete beams. Do not install in bottom of beams.

D. Steel Decking without Concrete Topping:
1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.

E. Installing suspended ceiling system for gypsum board (ASTM C635/C635M Option):
1. Install only for ceilings to receive screw attached gypsum board.
2. Install in accordance with ASTM C636/C636M. Support by hanger wires spaced a maximum of 48 inches on center, attaching hanger wires directly to structure above. Do not attach to metal deck.
   a. Install main runners spaced at a maximum of 1200 mm (48 inches) on center.
   b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center – but not less than recommended by grid manufacturer; locate for edge support of gypsum board.
   c. Install perimeter wall track angle or channel where grid suspension systems meet vertical surfaces.

E. Installing Ceiling Bracing System:
1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over-head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45-degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580/E580M.

3.7 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch.)

C. Level or align ceilings within 3 mm (1/8-inch.)

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SECTION 09 25 23
LIME-BASED PLASTERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Lime-based plaster coating over cementitious substrate.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Concrete masonry unit (CMU) substrate.

1.03 DEFINITIONS

A. Control Joint: A joint that accommodates movement of shrinkage and curing according to ASTM C1063.

B. Expansion Joint: A joint that accommodates movement beyond shrinking and curing according to ASTM C1063.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

C. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens).

D. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

E. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

F. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.

G. ASTM C469/C469M - Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.

H. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.

I. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.

J. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

K. ASTM C1498 - Standard Test Method for Hygroscopic Sorption Isotherms of Building Materials.

L. ASTM C1506 - Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters.

M. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) .

N. ASTM D4261 - Standard Practice for Surface Cleaning Concrete Masonry Units for Coating.

O. ASTM D6904 - Standard Practice for Resistance to Wind-Driven Rain for Exterior Coatings Applied on Masonry.

P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

Q. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

R. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C.

S. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

T. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

1.05 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, for submittals procedures.

B. Product Data: Manufacturer’s descriptive data, mixing procedures, application instructions, and precautions and limitations in product use.

C. Shop Drawings: Show locations and installation of expansion joints including plans, elevations, sections, details of components, and attachments to other work.

D. Samples for Selection:
   1. Plaster: Full range of available premium manufacturers color charts showing color, texture, pattern, and finish.
   2. Coloring Admixture: Color cards of manufacturers full range of colors.

E. Samples for Verification: For each type of finish coat indicated; provide 7- by 9-inch sample prepared on rigid backing showing texture and color.

F. Qualification Statements: For manufacturer and applicator.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company with not less than 20 years of experience in manufacturing products similar to scope of this Project and with a documented record of successful in-service performance.

B. Applicator Qualifications:
   1. Not less than five years’ documented experience in work of this Section.
   2. Successful completion of minimum of three projects of similar scope and complexity within past two years.
   3. Employ applicators experienced in exterior plaster applications and familiar with specified products.

1.07 MOCK-UP

A. Before beginning work of this Section, provide as many Mock-Ups as required to verify selections made under submittals and to demonstrate aesthetic effects and work execution. Approval does not constitute approval of deviations from Contract Documents, unless such deviations are specifically approved by Architect in writing.
   1. Erect as part of Mock-Up of exterior wall where directed by Architect and separate from actual construction.
   2. Show color and surface texture.
   3. Locate facing south so that the Mock-Up can be viewed in the direct sunlight.
   4. Approved Mock-Up may not remain as part of the Work.

1.08 DELIVERY, STORAGE AND HANDLING

A. Store materials under cover, dry, and protected from temperature extremes and contamination.

1.09 FIELD CONDITIONS

A. Environmental Requirements:
   1. Do not apply finishes at temperatures below 40 degrees Fahrenheit or above 95 degrees Fahrenheit.
      a. Exception for Ambient Temperatures below 40 degrees Fahrenheit: Provide temporary sheet coverings and supplemental heat to prevent freezing of finish materials.
   2. Do not apply finishes:
      a. During heavy or extended rain.
      b. To saturated or frozen surfaces.
   3. Protect finished surfaces from exposure to the following -- for 48 hours after application -- using small-sized mesh, tarps, or plastic sheeting:
      a. Direct sun.
      b. Winds above five miles per hour.
      c. Dust.
      d. Dirt.
      e. Frost.
      f. Precipitation.
   4. Dampen surfaces when required to prevent excess suction due to porosity of substrate or climatic conditions. Lightly wet surfaces but do not saturate.

1.10 WARRANTY

A. Provide manufacturer’s standard 20-year warranty against delamination and rain penetration.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design: Chaux et Enduits de Saint-Astier, Thermocromex FC (as distributed by Southwest Progressive Enterprises); Thermocromex Limestone High-Performance Cladding: www.thermocromex.com.
   1. Subject to compliance with requirements, provide either the basis-of-design or an equivalent product from one of the following:
      a. Firenze Enterprises’ “Firenzecolor”: https://firenzecolor.com/lime-based-plaster/.
      b. Mediterranean Colors, Ltd.: http://www.ecostucco.com/.
      c. TexSton Co.: https://www.texston.com/collections/lime-plasters.
      d. Transmineral USA, Inc. (aka Saint Astier Natural Hydraulic Lime (NHL)): http://www.limes.us/.
      e. Vero: http://www.vero-rialto.com/epoca_marmo.htm and http://www.vero-rialto.com/epocaottocento.htm.

2.02 LIMESTONE HIGH-PERFORMANCE CLADDING

A. Type: Based on natural hydraulic lime.

B. Characteristics:
   1. Granulometry (when tested per ASTM C136/C136M): 0.8 to 4.0 mm.
   2. Compressive Strength (when tested per ASTM C109/C109M):
      a. Average at 28 Days: 650 PSI.

b. At Full Cure: 1500 PSI.
3. Air Permeance (when tested per ASTM E2178): 0.002 at 75 Pa.
4. Flexural Strength (when tested per ASTM C348): 2.0 to 2.5 N/sq mm at 28 days.
5. Water Retention (when paste is tested per ASTM C1506): 94 percent plus-or-minus two percent.
6. Water Vapor Transmission Rate (when tested per Water Method (“Wet Cup” or “Procedure B”) of ASTM E96/E96M): 84 perms.
7. Wind Driven Rain Resistance (when tested per ASTM D6904): Passed (78 percent better than the standard for weight gain).
8. Salt Fog Exposure (when tested per ASTM B117): No significant change after 300 hours.
9. Average Sorption Isotherm (when tested per ASTM C1498): 1.36 percent at 90-percent relative humidity.
10. Impact Resistance (when tested using 140 Inch-Pound Impact per ASTM D2794): Pass.
11. Accelerated Weathering (after 2000 hours when tested per ASTM G154):
    a. Visual Color Change: None.
    b. 60 degree Gloss Change: 3 gloss units.
    c. Blistering: None.
    d. Chalking: None.
    e. Checking: None.
    f. Cracking: None.
12. Thermal Conductivity (when tested per ASTM C177): 1.02 square meters K/W.
13. Modulus of Elasticity (when tested per ASTM C469/C469M): 7584 MPa.
14. Flame Spread/Smoke Developed (when tested per ASTM E84):
    a. Over Cementitious Substrate: Class A.
15. Combustibility (when tested per ASTM E136): Non-combustible.
16. Effect of Application over One-Hour Fire-Resistance-Rated Wall Assembly: None.
17. Volatile Organic Compound (VOC) Content (per 40 CFR 59, Subpart D): 0.

C. Coloring Admixture: ASTM C979/C979M.
1. Color: See Section 09 06 00 - Schedule for Finishes.

2.03 ACCESSORIES

A. Bonding Agent (if required): ASTM C932.

B. Water: Clean and potable.

2.04 MIXES

A. Mix materials in accordance with manufacturer’s instructions using mechanical mixing equipment.

B. Add water to premixed bagged material at rate of 1-1/4 to 1-1/2 gallons per bag until desired consistency is achieved. Use same amount of water per bag for subsequent batches.

C. Add coloring admixture in accordance with manufacturer’s instructions; color shall match approved samples.

D. Continue mixing for between six and seven minutes total.

E. Clean mixer thoroughly as follows:
1. At end of each work day.

2. Whenever work is suspended for 60 minutes or more.
3. When changing colors.

F. Discard mixes not used within 60 minutes after mixing.

2.05 SOURCE QUALITY CONTROL:

A. Before applying materials to wall, perform slump and weight/density test using materials discharged directly from mixer.
1. On first batch daily.
2. Whenever equipment is not in use for more than 30 minutes.

B. Record results of each batch using form provided by manufacturer.

C. Record location of each batch number on copy of exterior building elevations.

D. Ensure consistent compliance with manufacturer’s slump and weight/density requirements.

E. Discard batches not complying with slump and weight/density requirements and adjust subsequent mixes as required.

F. If batches fail to meet required slump and weight/density requirements, remove applied finishes back to last verifiable point at no additional cost to Owner.

G. COR may request additional testing at any time during mixing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates to receive lime-based plaster for compliance with requirements and other conditions affecting performance.

B. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.

C. Starting work within a particular area will be construed as acceptance of surface conditions.

3.02 PREPARATION

A. Clean surfaces of loose and foreign matter that could interfere with adhesion of finish, including dust, paint, salts, oils, and organic matter.

B. Masonry Substrates:
1. Allow new masonry to cure minimum of 28 days before applying finishes.
2. Clean surfaces per ASTM D4261.
3. If vertical head joints are not filled, float joints flush.
4. Using a stainless-steel trowel, apply the acrylic-modified basecoat over the substrate at a thickness of between 1/16 and 3/32 inch.
5. Fully embed the fiberglass reinforcing mesh into the wet modified-acrylic basecoat including diagonal strips at corners of openings and trowel smooth. If 4.5 ounce fiberglass mesh is used, overlap seams 2-1/2 inches.

C. Building Expansion Joints: Design and locate as indicated on Drawings. At a minimum, expansion joints are required at the following locations:
1. Where expansion joints occur in the substrate system.
2. Where building expansion joints occur.
3. At floor lines.
4. Where it abuts dissimilar materials

5. Where the substrate changes
6. Where significant structural movement occurs such as changes in roofline, building shape, or structural system.

3.03 APPLICATION

A. Apply finish in accordance with manufacturer's instructions.
   1. Slope on window sills, copings, and other similar surfaces shall not be less than ten percent from horizontal.
   2. Provide a screed at base of wall, adequately secured to substrate.

B. Measure depth using depth gage or equivalent; ensure consistent thickness.
   1. Apply premium finish over masonry substrates to minimum thickness of 3/8 inch.
   2. If scored joints are indicated, apply additional thickness to maintain the 1/8-inch minimum requirement.
   3. When overall thickness exceeds 3/4 inch, apply in two coats.
   4. Do not exceed 1-1/2 inch total thickness.

C. Apply finish in premium flamed pattern.

D. Finish surfaces true-to-plane, plumb, and with neat, sharp corners and intersections.

E. Work in panels to nearest natural break formed by intersections, corners, trim, and accessories.

F. The following will NOT be acceptable:
   1. Lines caused by variations in application or finishing techniques.
   2. Cold joints.
   3. Other surface defects visible when viewed from a distance of 10 feet.

G. Debris netting is required when winds are five miles per hour and above.

H. Cure applied finishes with light water mist three to four times daily for two to three days after application. Prevent uneven and excessive evaporation from surfaces.

I. Installation Tolerance:
   1. Surface Tolerance: Maximum 1/8 inch in 10 feet variation from surface flatness.

J. Do not apply below grade. Provide minimum 4-inch clearance above earth grade, - or at grade for hardscape. Provide increased clearance in freeze/thaw climate zones.

K. Commence the installation after completion of floor, roof, and other construction that imposes dead loads on the walls to prevent excessive deflection and potential cracking.

3.04 FIELD QUALITY CONTROL

A. If this Project is the applicator's first application of specified product, manufacturer of finish shall provide on-site applicator training for a minimum of one day, including review of manufacturer's application instructions, equipment, application procedures, and curing

3.05 ADJUSTING

A. Repair or replace damaged, discolored, and defective finishes.

B. Patched areas shall match adjacent surfaces.

3.06 CLEANING

A. Remove finish from adjacent and underlying surfaces before it sets.

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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 Insulation: Section 07 21 13, THERMAL INSULATION.

C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical shaft wall assembly.
3. Typical fire-resistance-rated assembly and column fireproofing, indicating details of construction same as that used in fire-resistance-rating test.

D. Samples:
   1. Cornerbead.
   2. Edge trim.
   3. Control joints.

E. Test Results:
   1. Fire-resistance-rating test, each fire-resistance rating required for each assembly.
   2. Sound rating test.

F. Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.

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):

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475/C475M-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08.....Application and Finishing of Gypsum Board

C919-08.....Sealants in Acoustical Applications

C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177/C1177M-06.....Glass Mat Gypsum Substrate for Use as Sheathing

C1658/C1658M-06.....Glass Mat Gypsum Panels

C1396/C1396M-06.....Gypsum Board

C1629/C1629M-14a.....Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

D3272-12.....Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

E84-08.....Surface Burning Characteristics of Building Materials

E695-03.....Standard Test Method of Measuring Relative
(Reapproved 2009) Resistance of Wall, Floor, and Roof Construction to Impact Loading

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/C1396M (Paper-Faced Type) or ASTM C1658/C1658M (Glass-Mat-Faced Type), Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20-percent recycled gypsum.
   1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

B. Coreboard or Shaft Wall Liner Panels.
   1. ASTM C1396, Type X.
   2. ASTM C1658: Glass Mat Gypsum Panels,
   3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.

D. Gypsum cores shall contain maximum percentage of post-industrial recycled gypsum content available in the area (a minimum of 95-percent post-industrial recycled gypsum content). Paper facings shall contain 100-percent post-consumer recycled paper content.

2.2 GYPSUM SHEATHING BOARD

A. ASTM C1177/C1177M, Type X.

2.3 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.4 FASTENERS

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. For fire-resistance-rated construction, type and size same as used in fire-resistance-rating test.

E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.0 EXAMINATION

A. In areas requiring new work and patching, verify existing finishes shown in the finish schedule and on the plans. Immediately call any discrepancies to the COR's attention. New wall and ceiling finishes shall match the existing finishes, unless otherwise noted.

1. For existing ceiling patching, where ceiling is cut out or portions removed for removal of existing devices or installation of new work, patch the disturbed portion to match the existing ceiling finish.
2. Freestanding columns in a room shall receive the same finish as the room wall, unless otherwise noted.
3. Plaster or gypsum wallboard walls in an existing building from which vinyl wall fabric is removed, shall be cleaned of all adhesive and a skim coat of plaster shall be applied to receive the new finish.

3.1 GYPSUM BOARD HEIGHTS

A. Extend all layers of gypsum board from floor to underside of structure overhead unless otherwise noted.

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 only moisture and mold-resistant gypsum wallboard products.

D. Use gypsum boards in maximum practical lengths to minimize number of end joints.

E. Bring gypsum board into contact, but do not force into place.

F. Ceilings:

1. For single-ply construction, use perpendicular application.
2. For two-ply assembles:
   a. Use perpendicular application.
   b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

G. Walls (Except Shaft Walls):

1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Control Joints ASTM C840 and as follows:
   a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.

b. Not required for wall lengths less than 9000 mm (30 feet).

c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:

1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
   a. Construct walls between patient rooms – and between patient rooms and corridors – using tested wall assemblies with a minimum STC value of 45.
   b. Construct walls of patient-rooms walls that adjoin a service or public space using tested wall assemblies with a minimum STC value of 50.
   c. Sound-rated walls or partitions shall be entirely sealed off with closure gaskets and/or acoustical sealant at bottom, top, sides and any other abutment where a sound leak would otherwise occur.
3. For sound-rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between penetrations such as piping, ducts, conduit, receptacle boxes, and the like and the partition finish material through which the penetrating items protrude to pack and seal all holes and to provide the specified STC value for the wall assembly. Alternatively – for receptacle boxes – seal the openings on the back and sides of the boxes.

I. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
   a. Install at all vertical and horizontal external corners and where shown.
   b. Use screws only. Do not use crimping tool.
4. Edge Trim (Casings Beads):

a. At both sides of expansion and control joints unless shown otherwise.
b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
c. Where gypsum board surfaces of non-loadbearing assemblies abut loadbearing members.
d. Where shown.

3.3 INSTALLING GYPSUM SHEATHING

A. Install in accordance with ASTM C840, except as otherwise specified or shown.
B. Use screws of sufficient length to secure sheathing to framing.
C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.
D. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

3.4 CAVITY SHAFT WALL

A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing for two-hour fire rating. Conform to FM WALL CONSTRUCTION 25-1/HR (Non-loadbearing) for one-hour fire rating.
C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
2. Stagger joints top and bottom in adjacent panels.
3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
D. Gypsum Board:
1. Two hour wall:
a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.

b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.

c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.

2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.

3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.

E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

F. Elevator Shafts:

1. Protrusions including fasteners other than flange of shaft wall framing system or offsets from vertical alignments more than 3 mm (1/8-inch) are not permitted unless shown.

2. Align shaft walls for plumb vertical flush alignment from top to bottom of shaft.

3.5 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for al finished areas open to public view.

B. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.

2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non-decorated smoke barrier, fire-resistance-rated, and sound-rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire-resistance-rated, and sound rated construction. Sanding is not required of non-decorated surfaces.

3.6 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded, or damaged finish surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction, and STC equivalent to the sound-rated construction.

3.7 UNACCESSIBLE CEILINGS (NOT USED)

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SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies interior porcelain tile and tile backer board.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.

C. Color, Texture, Pattern, and Size of Field Tile, and Color of Grout Specified: Section 09 06 00, SCHEDULE FOR FINISHES.

D. 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. Sustainable Design Submittals as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Samples:

1. Wall tile, each color, size, and pattern.

D. Product Data:

1. Porcelain tile, marked to show each type, size, and shape required.
2. Chemical-resistant grout (epoxy).
3. Cementitious backer unit.
4. Dry-set Portland-cement mortar.
5. Reinforcing tape.
6. Patching and leveling compound.
7. Latex-modified Portland-cement mortar.
8. Fasteners.

E. Certification:

1. Master grade certificate, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:

a. Chemical-resistant grout (epoxy).
b. Cementitious backer unit.
c. Dry-set Portland-cement mortar.
d. Reinforcing tape.
e. Latex-modified Portland-cement mortar.
f. Patching and leveling compound.

F. Installer Qualifications:
1. Submit letter stating installer’s experience.

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 shall 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 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):
A108/A118/A136-14.....Installation of Ceramic Tile
A108.01-13.....Subsurfaces and Preparations by Other Trades
A108.1B-99 (Reaffirmed 2010) Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
A108.6-10.....Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
A118.1-12.....Dry-Set Cement Mortar

A118.3-13.....Chemical Resistant, Water Cleanable Tile-Setting and –Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive
A118.4-12.....Modified Dry-Set Cement Mortar
A118.7-10.....High Performance Cement Grouts for Tile Installation
A118.9-10.....Cementitious Backer Units
A137.1-12.....American National Standard Specifications for Ceramic Tile

C. ASTM International (ASTM):
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
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
C1325-14.....Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

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 (2014)

PART 2 - PRODUCTS

2.1 TILE:

A. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
2. 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.

3. 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 epoxy or set with latex-modified mortars.

B. Porcelain Paver Tile: Nominal 8 mm (5/16 inch) thick, with cushion edges. Porcelain tile produced by the dust pressed method are to be made of approximately 50-percent feldspar; the remaining 50-percent is to be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5 percent or less and a breaking strength of between 176 to 181 kg (390 to 400 pound-force).

C. Trim Shapes:
   1. Conform to applicable requirements of adjoining wall tile.
   2. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed on Construction Documents or specified otherwise.

2.2 BACKER UNITS:

A. Cementitious Backer Units:
   1. Conform to ASTM C1325; Type A.
   2. Use in maximum lengths available to minimize end to end butt joints.

2.3 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-modified 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.

2.4 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-resistance-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.

2.5 SETTING MATERIALS OR BOND COATS:

A. Conform to TCNA Handbook for Ceramic Tile Installation.

B. Latex-Modified Portland Cement Mortar: ANSI A118.4.

1. For wall applications, provide non-sagging, latex-modified Portland-cement mortar complying with ANSI A118.4.
2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, re-dispersible, ethylene-vinyl-acetate additive; and other ingredients to which only water needs to be added at Project site.

C. Dry-Set Portland Cement Mortar: ANSI A118.1. For wall applications, provide non-sagging, latex-modified Portland cement mortar complying with ANSI A118.1.

2.6 GROUTING MATERIALS:

A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).

1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 60 and 100 degrees C (140 and 212 degrees F), respectively, and certified by manufacturer for intended use.

2.7 PATCHING AND LEVELING COMPOUND:

A. 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.

B. 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.

C. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
D. Ready for use in 48 hours after application.

2.8 MARBLE (NOT USED)

2.9 METAL DIVIDER STRIPS (NOT USED)

2.10 WATER:

A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.11 CLEANING COMPOUNDS (NOT USED)

2.12 FLOOR MORTAR BED REINFORCING (NOT USED)

2.13 POLYETHYLENE SHEET (NOT USED)

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 Wall Surfaces:
   1. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where dry-set or latex-modified Portland-cement mortar is used.

3.3 SURFACE PREPARATION:

A. Patching and Leveling:
   1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
   2. Fill holes and cracks with patching and leveling compound.

a. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces that are out of required plane.

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-modified Portland-cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.

3.5 GLASS MAT WATER-RESISTANT BACKING BOARD (NOT USED)

3.6 MARBLE (NOT USED)

3.7 METAL DIVIDER STRIPS (NOT USED)

3.8 CERAMIC 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 wall tile installed over concrete backer board in latex-modified Portland-cement mortar, ANSI A108.1B.

2. 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 shall be free from hollow-sounding areas and from loose, cracked, or defective tile.
7. Remove and reset tiles that are out-of-plane or misaligned.
8. Walls:
   a. 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.
   b. Finish reveals of openings with tile, except where other finish materials are indicated in Construction Documents.
   c. 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.
9. Joints:
   a. Keep all joints in-line, straight, level, perpendicular, and of even width unless shown otherwise on Construction Documents.
   b. Make joints in tile, porcelain type; maximum 3 mm (1/8 inch) wide.

10. Back Buttering: For installations indicated below, obtain 100-percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108/A118/A136 series of tile installation standards:
    a. Tile installed with chemical-resistant grouts.
    b. Tile wall installations composed of tiles 203 by 203 mm (8 by 8 inches) or larger.

3.9 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR (NOT USED)

3.10 PORCELAIN TILE INSTALLED WITH LATEX-MODIFIED PORTLAND-CEMENT BONDING MORTAR (NOT USED)

3.11 THIN-SET PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND-CEMENT AND LATEX-MODIFIED PORTLAND-CEMENT MORTAR:

A. Installation of Tile: ANSI A108.1B, except as specified otherwise.

3.12 THIN-SET CERAMIC AND PORCELAIN TILE INSTALLED WITH ORGANIC ADHESIVE (NOT USED)

3.13 THIN-SET CERAMIC AND PORCELAIN TILE INSTALLED WITH CHEMICAL-RESISTANT BOND COAT (NOT USED)

3.14 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT (NOT USED)

3.15 GROUTING:

A. Workmanship:
    1. Install and cure grout in accordance with the applicable standard.
    2. Epoxy Grout: ANSI A108.6.
    3. Water-Cleanable Epoxy Grout: ANSI A118.3.

3.16 MOVEMENT JOINTS:

A. Prepare tile expansion, isolation, construction, and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
B. TCNA details EJ 171-14.

3.17 CLEANING:

A. Thoroughly sponge and wash tile.
B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.
C. Clean tile grouted with epoxy grout as recommended by the manufacturer of the grout and bond coat.

3.18 PROTECTION:

A. Keep traffic off tile floor, until grout and setting material is fully set and cured.

B. Where traffic 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.

3.19 TESTING FINISH FLOOR (NOT USED)

- - - 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.
B. Ceiling Suspension System: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 DEFINITIONS

A. Conform to ASTM C634 for interpretation of acoustical terms used in this Section.

1.4 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. American Society of Civil Engineers (ASCE):
   1. ASCE 7-10 (with 2013 Supplements and Errata) – Minimum Design Loads for Buildings and Other Structures.
C. ASTM International (ASTM):
   1. A641/A641M-09a (Reapproved 2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
   2. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   3. C634-13 - Terminology Relating to Environmental Acoustics.
   4. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   5. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
   6. E84-15b - Surface Burning Characteristics of Building Materials.
   7. E413-16 - Classification for Rating Sound Insulation.
   8. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

a. Installer shall have a printed copy of ASTM E580/E580M on-site and shall ensure that installation personnel are aware of its installation requirements.

9. E1264-14 - Classification for Acoustical Ceiling Products.

D. International Organization for Standardization (ISO):

1. ISO 14644-1 - Classification of Air Cleanliness.

1.5 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting at Project site minimum 30 days before beginning Work of this Section.

1. Required Participants:

a. Contracting Officer's Representative (COR).

b. VA Interior Designer.

c. Contractor.

d. Installer.

e. Manufacturer's field representative.

f. Other installers responsible for adjacent and intersecting work, including sprinkler, HVAC, and lighting installers.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.

a. Installation schedule.

b. Installation sequence.

c. Preparatory work.

d. Protection before, during, and after installation.

e. Installation.

f. Terminations.

g. Transitions and connections to other work.

h. Inspecting and testing.

i. Other items affecting successful completion.

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

1.6 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. Provide detailing to indicate intent of installation to comply with ASTM E580/E580M seismic requirements:
   a. Provide perimeter wall detailing, interface with wall angles, suspension details and dimensioning showing compliance with seismic requirements for the Seismic Design Category of the Project.
   b. Indicate seismic joints.

C. Manufacturer's Literature and Data:
   1. Description of each product.
      a. For Accessories Intended to Be Installed: For determination of compliance with seismic requirements.
         1) This shall include service accessories intended to be provided at ceiling system penetrations. Contractor shall coordinate Work for components penetrating the ceiling system.
   2. Ceiling suspension system indicating manufacturer recommendation for each application.
   3. Installation instructions: Indicate special procedures, perimeter conditions requiring special attention, and required items to comply with seismic requirements.
   4. Warranty.

D. Samples:
   1. Acoustical units, 150 mm (6 inches) in size, each type.
   2. Suspension system, trim, and molding, 300 mm (12 inches) long.
   3. Colored markers for access service.

E. Certificates: Certify each product complies with specifications.
   1. Acoustical units, each type.
   2. From manufacturer indicating that the proposed ceiling system meets or exceeds the seismic requirements of ASTM E580/E580M for the Seismic Design Category of the Project.

F. Qualifications: Substantiate qualifications comply with specifications.
   1. Manufacturer with project experience list.

G. Operation and Maintenance Data:
   1. Care instructions for each exposed finish product.

H. Maintenance Material Submittals (Extra Stock Materials): Furnish the following for Owner's use in maintenance of Project. Materials to match

products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Hold-Down Clips: Equal to two percent of amount installed.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Regularly manufactures specified products.
   2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.

B. Seismic Design: Design suspension system for seismic considerations under direct supervision of Professional Structural Engineer experienced in design of this work and licensed in the state where the work is located. Comply with ASTM E580/E580M for ceiling suspension systems requiring seismic restraint.

1.8 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.

1.9 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight, conditioned facility.

B. Protect products from damage during handling and construction operations.

1.10 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.

1.11 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.
C. Seismic Design Categories D, E, and F:
   1. Provide a restrained ceiling grid system through either connection to the perimeter wall or through bracing, with adequate clearance to avoid imposing restraining loads on the ceiling system. The following conditions shall apply to all acoustical ceiling system installations:
      a. Only heavy-duty main tees as defined by ASTM C635/C635M shall be provided for all acoustical ceiling gird systems.
      b. Main runners and cross runners of the ceiling system and their splices, intersection connectors, and expansion devices shall be designed and constructed to carry a mean ultimate test load of not less than 180 pounds in tension and in compression. Connectors at splices and intersections shall be mechanical interlocking type.
      c. Wall angles or channels shall be considered as aesthetic closers and shall have no structural value assessed to themselves or their method of attachment to the walls.
      d. Permanent runner end attachment (including pop rivets or other fasteners) for grid alignment purposes shall be provided at two adjacent walls only in compliance with ASTM E580/E580M, with a minimum of 3/4-inch clearance between main and cross runner ends and perimeter members at opposite walls.

e. Perimeter closure angles or channels shall provide a support ledge of 2 inches minimum.
f. Terminal ends of main runners and cross runners not mechanically attached shall be prevented from spreading. Use of accessory spacer bars is therefore required for all installations of suspended acoustical ceiling systems.
g. Ceiling penetrations (columns, sprinklers, and the like) and independently supported fixtures or services shall allow at least 1 inch of free movement in all horizontal directions. Sprinkler heads and other penetrations shall have a 2-inch oversized ring, sleeve, or adapter through the ceiling panel to permit the required 1-inch free horizontal movement. Provide suitable, finished escutcheons, trim detailing or adapter rings at all such locations. Integral ceiling and sprinkler construction as defined in Paragraph 5.2.8.8 of ASTM E580/E580M shall not be permitted for the Project.
h. Continuous ceiling areas shall be limited to 2,500 square feet in area. Ceiling areas exceeding 2,500 square feet shall have a seismic separation joint, bulkhead braced to structure, or full-height partition such that the overall resulting ratio of length to width of each area is less than or equal to 4. Each area shall be capable of allowing 3/4-inch axial movement.
i. Changes in ceiling elevation shall have independent positive bracing.
j. Lateral Force Bracing (LFB) shall be provided for ceiling areas greater than 1,000 square feet. Seismic LFB shall be compliant with ASTM E580/E580M, Seismic Design Categories D,E & F and the following:
    1) LFB shall be comprised of a combination of four wires no less than 0.1055-inch-diameter (fka 12-gage) and a compression strut secured to the main runner and extending to the structure above. Wires shall be splayed at 90 degrees from each other in the horizontal direction and be at a vertical angle of no more than 45 degrees from the main runner horizontal.

2) LFB shall be located within 2 inches of the cross runner intersection.
3) LFB shall be spaced no greater than 12 feet on center in both directions, and no more than 6 feet from each perimeter wall.
4) Attachment of the restraint wires and strut to the main runner and structure above shall be adequate for the load imposed.
5) LFB shall be spaced a minimum of 6 inches from horizontal piping or duct work not provided with bracing restraints against horizontal forces.

k. Lighting fixtures shall be positively attached to the suspended ceiling system by mechanical means in compliance with the National Electrical Code. Attachment devices shall be capable of supporting the total lighting fixture weight acting in any direction. A minimum of two attachment devices are required for each fixture.

l. Surface-mounted lighting fixtures shall be attached to the ceiling grid system with positive clamping devices completely surrounding the supporting members. Safety wires shall be attached between the clamping device and the adjacent ceiling hanger or to the structure above. In no case shall the fixture exceed the design carrying capacity of the supporting members.

2. Design and size components of ceiling assemblies to withstand the effects of earthquake motions according to ASTM E580/E580M and Chapter 16 of the CBC, Seismic Design Categories D, E, and F.

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: 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. 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. 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.
   d. CAC (Ceiling Attenuation Class): ASTM E413, 35 unless specified otherwise.
   e. LR (Light Reflectance): Minimum 0.75 on the exposed surfaces, except as specified otherwise.
3. Lay-in panels: Sizes as indicated on Drawings, with square edges.
   a. Sizes:
      1) Edge and Joint Detail: Square 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.
1. Type III-A Units - Mineral base with painted finish.
   a. Form 1, modular, cast or molded.
   b. NRC: 0.75 minimum.
   c. Thickness: 19 mm (3/4 inch) minimum.
   d. Weight, 4.9 kg/sq. m (one pound per square foot).
2. Type XX-B Units - Combination mineral base and glass fiber with fabric finish.
   a. Back Half of Panel: Perforated water felted mineral fiber.
   b. Face Half of Panel: Glass fiber with glass cloth face.
   c. NRC: 0.75 minimum.
   d. Thickness: 28 mm (1 1/8 inches) minimum.

2.5 METAL SUSPENSION SYSTEM

A. General: ASTM C635/C635M, heavy-duty system per Table 1, except as otherwise specified.
1. Suspension System: Provide the following:
   a. Galvanized cold-rolled steel, Bonderized.

2. Main and Cross Runner: Use same construction. Do not use lighter-duty sections for cross runners.
3. Attachment devices, wire for hangers and ties, seismic stabilizer bars, seismic struts, and wall moldings shall meet the requirements for Seismic Categories D, E, and F.

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.
   a. Provide minimum 2-inch flange on metal edge moldings.
3. Finish: Baked-on enamel flat texture finish.

C. Color: To match adjacent acoustical units.Carrying Channels Secondary Framing: Cold-rolled or hot-rolled steel, black asphaltic paint finish, rust free.
1. Weight per 300 m (per thousand linear feet), minimum:

Size		Cold-rolled		Hot-rolled	
mm	inches	kg	Pound	kg	pound
38	1-1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

D. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.
1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).
   a. Nailing type option for wood forms:
      1) Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
      2) Lower portion provided with minimum 8 mm (5/16 inch) hole to permit attachment of hangers.
   b. Flush ceiling insert type:
      1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.

2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

E. Clips: Galvanized steel, designed to secure framing member in place.
F. Tile Splines: ASTM C635/C635M.
G. Wire: ASTM A641/A641M.
1. Size:
a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).
H. Secure ceiling panels and seal tight against gasketing with suspension manufacturer’s standard hold-down / retention clips spaced 24 inches on center on all cross tees.

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

C. Stabilizer Bars: Manufacturer's standard bars used to maintain uniform spacing of suspension system component main and cross tees in compliance with ASTM E580/E580M for seismic applications.

D. Seismic Struts: Provide grid manufacturer’s standard compression struts, as indicated, designed to accommodate seismic forces.

E. Seismic Separation Joint: Manufacturer's continuous slip joint support member and related accessories designed and tested to separate ceiling areas greater than 2,500 square feet to comply with ASTM E580/E580M requirements in Seismic Categories D, E and F.

F. Service Accessories: Contractor shall coordinate with all trades to provide appropriate accessories for all service penetrations within the ceiling assembly.

1. Provide minimum 2-inch diameter opening and oversized ring, sleeve, escutcheon or adapter through the ceiling panel at penetrations to allow a full 1-inch minimum free movement in all directions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify substrate suitability for product installation.

3.2 PREPARATION

A. Protect completed work from damage.

3.3 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 consideration by Contracting Officer’s Representative (COR).

3.4 ACOUSTICAL UNIT INSTALLATION

A. Applications:

1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Layout acoustical unit symmetrically, with minimum number of joints, unless shown otherwise on reflected ceiling plan.

C. 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. In behavioral health areas, install hold-down clips on each panel to retain panels tight to grid system.
c. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.

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 unit.

D. Touch up damaged factory finishes.
1. Repair painted surfaces with touch-up primer.

3.5 CEILING SUSPENSION SYSTEM INSTALLATION

A. General: Install according to ASTM C636/C636M and the seismic design requirements of ASCE 7 for the Seismic Design Category of the Project.
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 minimum 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.
6. Provide main runners minimum 1200 mm (48 inches) in length.
7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
8. Coordinate locations of hangers with other work.
a. Comply with ASTM E580/E580M relative to suspension system applications, ceiling-mounted items, and penetrations.

9. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
    a. Exceptions shall be granted for wall hangar attachment where permitted by ASTM E580/E580M for the Seismic Design Category of the Project.
    b. Carrying member splices shall be constructed to carry the mean load required by ASTM E580/E580M for the Seismic Design Category of the Project.
        1) Provide seismic clips to comply with splice support and load capacity requirements.
    c. Connectors and splices at intersections shall be mechanical interlocking type.

B. Direct Hung Suspension System: See Figure 1 in ASTM C635/C635M.
    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.
        a. Provide additional supports as required to comply with the Seismic Design Category of the Project.

C. Anchorage to Structure:
    1. Concrete:
        a. Use eye pins or threaded studs with screw-on eyes in 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 4 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.

D. Indirect Hung Suspension System: See Figure 1 in ASTM C635/C635M.
   1. Space carrying channels for indirect-hung suspension system maximum 1200 mm (4 feet) on center. Space hangers for carrying channels maximum 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) or center so as to insure that specified requirements are not exceeded.
   2. Support main runners by specially designed clips attached to carrying channels.

E. Seismic Ceiling Bracing System:
   1. Install according to ASTM E580/E580M for Seismic Design Category D.
   2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

F. Seismic Requirements for hanging suspension systems in Seismic Design Categories D, E and F:
   1. Provide a restrained ceiling grid system through either connection to the perimeter wall or through bracing, with adequate clearance to avoid imposing restraining loads on the ceiling system. The following conditions shall be achieved in all acoustical ceiling system installations:
      a. Only heavy-duty main tees as defined by ASTM C635/C635M shall be provided for all acoustical ceiling gird systems.
      b. Main runners and cross runners of the ceiling system and their splices, intersection connectors, and expansion devices shall be constructed to carry a mean ultimate test load of not less than 180 pounds in tension and in compression. Connectors at splices and intersections shall be mechanical interlocking type.
      c. Perimeter closure angles or channels shall provide a support ledge of 2 inches minimum.

d. Wall angles or channels shall be considered as aesthetic closers and shall have no structural value assessed to themselves or their method of attachment to the walls.
e. Permanent runner end attachment (including pop rivets or other fasteners) for grid alignment purposes shall be provided at two adjacent walls only in compliance with ASTM E580/E580M.
f. No permanent attachment is permitted at runner ends at opposite walls at intersection with perimeter closure angles. A minimum of 3/4-inch clearance shall be maintained between main and cross runner ends and perimeter members at opposite walls in compliance with ASTM E580/E580M.
g. Terminal ends of main runners and cross runners not mechanically attached at opposite walls shall be prevented from spreading. Provide stabilizer bars at all terminal ends of main and cross runners at opposite walls within 4 inches of wall.
h. Ceiling penetrations (columns, sprinklers, and the like) and independently supported fixtures or services shall allow at least 1 inch of free movement in all horizontal directions. Sprinkler heads and other penetrations shall be fitted with a 2-inch-diameter oversized ring, sleeve, or adapter through the ceiling tile to permit the required 1-inch free horizontal movement. Provide suitable, finished escutcheons, trim detailing, or adapter rings at all such locations. Integral ceiling and sprinkler construction as defined in Paragraph 5.2.8.8 of ASTM E580/E580M shall not be permitted for the Project.
i. Continuous ceiling areas shall be limited to 2,500 square feet in area. Provide seismic separation joint(s) and related accessories at ceiling areas as indicated to maintain a maximum of 2,500 square foot separate ceiling areas in compliance with ASTM E580/E580M.
    1) Each area shall be capable of allowing 3/4-inch axial movement.
j. Provide independent positive bracing at changes in ceiling elevation.

k. Provide Lateral Force Bracing (LFB) for ceiling areas greater than 1,000 square feet. Seismic LFB shall be compliant with ASTM E580/E580M, Seismic Design Categories D, E, and F and the following:
   1) LFB shall be comprised of a combination of four 12 gage wires and a compression strut secured to the main runner and extending to the structure above. Wires shall be splayed at 90 degrees from each other in the horizontal direction and be at a vertical angle of no more than 45 degrees from the main runner horizontal.
   2) Locate LFB within 2 inches of the cross runner intersection.
   3) Space LFB no greater than 12 feet on center in both directions, and no more than 6 feet from each perimeter wall.
   4) Restraint wires and strut shall be attached to the main runner and structure above with anchorages adequate for the load imposed.
   5) LFB shall be spaced a minimum of 6 inches from horizontal piping or duct work not provided with bracing restraints against horizontal forces.

l. Lighting fixtures shall be positively attached to the suspended ceiling system by mechanical means. A minimum of two attachment devices are required for each fixture. Attachment devices shall be capable of supporting the total lighting fixture weight acting in any direction.

m. Attach surface-mounted lighting fixtures to the ceiling grid with positive clamping devices completely surrounding supporting members. Safety wires shall be attached between the clamping device and the adjacent ceiling hanger or to the structure above. In no case shall the fixture exceed the design carrying capacity of the supporting members.

n. At sprinkler heads and other penetrations, provide a 2-inch-diameter oversized ring, sleeve, or adapter through the ceiling panel to allow a minimum 1-inch free movement of the ceiling assembly.

3.6 CEILING TREATMENT

A. Moldings:

1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
2. Install special-shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.

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.

3.7 CLEANING

A. Clean exposed surfaces. Remove contaminants and stains.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base (RB) adhered to interior walls and partitions.

1.2 RELATED REQUIREMENTS

A. Sheet Flooring Integral Base: Section 09 65 16, RESILIENT SHEET FLOORING.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.
B. ASTM International (ASTM):
   1. F1861-08(2012)e1 - Resilient Wall Base.
   2. D4259-88(2012) - Abrading Concrete.
C. International Concrete Repair Institute (ICRI):
   1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

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. 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. Sustainable Construction Submittals:
   1. Low Pollutant-Emitting Materials:
      a. Show volatile organic compound types and quantities.
E. 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 when handling and during 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 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.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide each product from one manufacturer and from one production run.
C. Sustainable Construction Requirements:
1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
a. Flooring Adhesives and Sealants.

2.2 RESILIENT BASE

A. Resilient Base (RB-1): 3 mm (1/8 inch) thick, 100 mm (4 inches) high.
1. Type: Rubber; use one type throughout.
2. ASTM F1861, Type TP thermoplastic rubber.

B. Resilient Base (RB-2): 3 mm (1/8 inch) thick, 108 mm (4.25 inches) high.
   1. Type: Rubber; use one type throughout.
   2. ASTM F1861, Type TP thermoplastic rubber.
C. Applications:
   1. Cove.

2.3 RESILIENT STAIR TREADS (NOT USED)

2.4 SHEET RUBBER FLOORING (NOT USED)

2.5 PRIMER (FOR CONCRETE FLOORS)

A. Primer: Type recommended by adhesive manufacturer.

2.6 LEVELING COMPOUND (FOR CONCRETE FLOORS)

A. Leveling Compound: Provide products mixed with latex or polyvinyl acetate resins.

2.7 ADHESIVES

A. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
   1. In areas requiring new work and patching, verify existing finishes shown in the finish schedule and on the plans. Immediately call any discrepancies to the COR's attention. New base finishes shall match the existing finishes, unless otherwise noted.
      a. Freestanding columns in a room shall receive the same finish as the room wall, unless otherwise noted.
      b. Where new finishes are applied to existing, the existing finishes shall be removed and/or the existing surfaces prepared as required to receive new finishes, unless otherwise noted.
      c. Where wall surfaces are patched to match the existing, the new finish shall be applied to the nearest corner or break in the wall plane, unless otherwise noted.
      d. In areas that have an existing base finish of quarry tile or ceramic tile and are noted to receive a resilient base finish,

the ceramic/quarry tile shall be removed and the area shall be leveled in preparation for the new finish.

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.

1. Mechanically clean concrete floor substrate according to ASTM D4259.
2. Surface Profile: ICRI Guideline No. 310.2R.

F. Allow substrate to dry and cure.

G. Perform flooring manufacturer’s recommended bond, substrate moisture content, and pH tests.

3.2 INSTALLATION GENERAL

A. Install products according to manufacturer's instructions.

1. When instructions deviate from specifications, submit proposed resolution for consideration by Contracting Officer’s Representative (COR).

3.3 RESILIENT BASE INSTALLATION

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. Conventional Wall Base (RB-1 and RB-2): Field-form corners and end stops.
1. V-groove back of outside corner.
a. Where the length of base on one or both sides of an outside corner are less than 4 inches, or where two corners are within 8 inches of each other, take extraordinary measures to ensure that the lengths of wall base on either sides do not de-laminate from the substrate. These measures can include -- but are not limited to -- one or more of the following:
1) Folding the wall base at the corner to 360 degrees and using a suitably sized flat-faced weight to keep the flat portions in that position for an appropriate length of time.
2) Applying a primer recommended by the adhesive manufacturer to the entire area of the substrate that will receive the wall base.
3) Using an adhesive with the highest bond strength available.
4) Applying adhesive to the entire back surface of the wall base.
5) Securing a flat-faced object against the flat portions of the applied wall base for an appropriate length of time.
2. V-groove face of inside corner and notch cove for miter joint.

E. Roll resilient base ensuring complete adhesion.

3.4 RESILIENT STAIR TREAD INSTALLATION (NOT USED)

3.5 SHEET RUBBER FLOORING INSTALLATION (NOT USED)

3.6 CLEANING

A. Remove excess adhesive before adhesive sets.
B. Clean exposed resilient base surfaces. Remove contaminants and stains.
1. Clean with mild detergent. Leave surfaces free of detergent residue.

3.7 PROTECTION

A. Replace damaged products and re-clean.

1. Damaged Products include cut, gouged, scraped, torn, and unbonded products.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Welded seam sheet flooring (WSSV) with heat-welded seams and integral cove base.

1.2 RELATED REQUIREMENTS

A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
B. Color, Pattern and Texture: Section 09 06 00, SCHEDULE FOR FINISHES.
C. Resilient Base over Base of Equipment and Casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 APPLICABLE PUBLICATIONS

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. F1913-04(2014) - Vinyl Sheet Floor Covering Without 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.

1.4 SUBMITTALS

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 Product Data:
   1. Description of each product.
   2. Application and/or installation instructions.
   3. Warranty.
C. Samples:

1. Sheet Material: 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with welded seam using proposed welding rod.
2. Edge strips: 150 mm (6 inches) long each type.
3. Primer: Pint container, each type.

D. Shop Drawings: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
   1. Minimum Scale: 1/8 inch equals 1 foot.

E. Certificates: Quality Control Certificate Submittals.
   1. Certify each Product complies with specifications.
   2. Certify heat-welded seaming is manufacturer's prescribed method of installation.

F. Sustainable Construction Submittals:
   1. Low Pollutant-Emitting Materials:
      a. Sheet Flooring: Submit FloorScore label.
      b. Identify volatile organic compound types and quantities.

G. Qualification Statements: Substantiate that qualifications comply with specifications.
   1. Manufacturer with project experience list.
   2. Installer with project experience list.

H. Closeout Submittal: Agenda and dated attendance list from demonstration and training session.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
      a. Project Experience List: Provide contact names and addresses for completed projects.

B. Installer Qualifications:
   1. Regularly installs specified products and is approved by the manufacturer.
      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, 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 indoors in dry, weathertight, and conditioned facility.
B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

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.

1.9 WARRANTY

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.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

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.

2.2 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
B. Provide vinyl sheet color and pattern from one production run.
C. Sustainable Construction Requirements:

1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
   a. Flooring Adhesives and Sealants.
   b. Vinyl Sheet Flooring.

2.3 RESILIENT SHEET FLOORING

A. Resilient Sheet Flooring (WSSV-2): ASTM F1913; Vinyl, without backing.
   1. Wear Surface: Smooth.
   2. Thickness: 2 mm (0.080 inches).

B. Resilient Sheet Flooring (WSSV-1): ASTM F1303; Type I, Grade 1, vinyl, with backing.
   1. Wear Surface: Smooth.
   2. Wear Layer Thickness: Minimum 0.51 mm (0.020 inches).
   3. Total Thickness: 2 mm (0.080 inches).

C. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
   1. Minimum Width: 1200 mm (48 inches).

2.4 WELDED SEAM SHEET FLOORING (NOT USED)

2.5 ACCESSORIES

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. Integral Base Accessories:
   1. Fillet Strip: 25 mm (1 inch) radius rigid polyvinyl-chloride (PVC) fillet strip with a minimum Type-A durometer hardness of 85 per ASTM D2240 compatible with flooring material.
      a. Basis-of-Design: Johnsonite, a Tarkett Company; CFS-00-M: www.tarkettna.com.
   2. Cap Strip: J-shaped extruded-aluminum profile compatible with flooring material and shaped to receive 1/8-inch-thick flooring material.
      a. Height of Concealed Leg against Wall: Approximately 3/4 inch.
      b. Overall Horizontal Projection from Wall: Approximately 1/4 inch.

c. Vertical Lip Capturing Flooring: Approximately 1/4 inch high.
d. Basis-of-Design: National Metal Shapes; 524: www.nationalmetalshapes.com.

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: 1-1/4-inch-wide by 1/8-inch-thick by 25-foot-long resilient transition profile beveled along one edge.
1. Basis-of-Design: Johnsonite, a Tarkett Company; RRS-XX-D: www.tarkettna.com.

G. Sealant:
1. As specified in Section 07 92 00, JOINT SEALANTS.
2. Compatible with flooring.

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 sheet 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 plastering, drywall finishing, concrete, terrazzo, 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.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions.
   1. When manufacturer's instructions deviate from specifications, submit proposed resolution for consideration by Contracting Officer’s Representative (COR).

3.3 INSTALLATION OF FLOORING

A. Flooring Layout:
   1. Arrange pattern in one direction.
   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.
G. Installation of Edge Strips:
   1. Install edge strips at flooring terminations and transitions to other floor finishes.

2. Locate edge strips under center lines of doors unless otherwise indicated.
3. Set edge strips in adhesive and mechanically fasten to substrate.

3.4 INTEGRAL COVE BASE INSTALLATION

A. Set preformed rigid fillet strip at floor intersection with walls and other vertical surfaces.
B. Extend flooring over fillet strip and 150 mm (6 inches) up wall surface.
C. Form straight or radius internal and external corners to suit Application.
D. Adhere base to wall surface.
E. Construct outside corners using "B-plug" or “butterfly” piece.
F. Terminate base exposed top edge with cap strip. Seal cap strip to wall with sealant.
   1. Provide aluminum cove caps with rolled corners formed after creating triangular voids using a metal mitre or "nipper" (for example, No. 851 Die Set with Handle by Crain Floor Covering Tools).
      a. Use of a hacksaw and a miter box to create corners will not be acceptable.
G. Weld joints as specified for flooring.

3.5 HEAT WELDING

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.

3.6 CHEMICAL WELDING (NOT USED)

3.7 CLEANING

A. Remove excess adhesive before adhesive sets.
B. Clean 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.

3.8 PROTECTION

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.

3.9 CLOSEOUT ACTIVITIES

A. Demonstration and Training Session: Schedule and conduct with the Owner's maintenance staff. Session shall include instruction on the care and use of the installed flooring by representative(s) of the flooring manufacturer(s) – and actual use of the required cleaning equipment by all in attendance. Record names and job descriptions of attendees and submit with agenda as a Closeout Submittal. At the end of the session, participants shall be able to:
   1. Select the proper cleaning chemicals, equipment, tools, and materials.
   2. Identify the best practices and proper methodologies for floor maintenance.
   3. Explain how to clean in ways that maintain flooring appearance and extend flooring life.

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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. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

C. Subfloor Testing and Preparation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

D. 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. Sustainable Design Submittals as described below:

1. Volatile organic compounds per volume as described in PART 2 - PRODUCTS.
2. Postconsumer and pre-consumer recycled content as described in PART 2 - PRODUCTS.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Resilient material manufacturer’s recommendations for adhesives, underlayment, and primers.
3. Application, installation and maintenance instructions.

D. 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.

E. Shop Drawings:

1. Layout of patterns as shown on the construction documents.
2. Edge strip locations showing types and detail cross sections.

F. 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.

G. Closeout Submittal: Agenda and dated attendance list from demonstration and training session.

1.4 DELIVERY:

A. Deliver materials to the Project 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

D2240-05(R2010).....Test Method for Rubber Property—Durometer Hardness

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

F1700-13a.....Solid Vinyl Floor Tile

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

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, and primers 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 RUBBER TILE (NOT USED)

2.3 LINOLEUM TILE (NOT USED)

2.4 VINYL COMPOSITION TILE (NOT USED)

2.5 SOLID VINYL-TILE (NOT USED)

2.6 LUXURY VINYL TILE:

A. ASTM F1700, Class III, Printed Film Vinyl Tile, Type B (Embossed).

B. Thickness: 2.5mm (0.1 inch).

C. Size: See Drawings.

D. Provide products with recycled content with not less than 30 percent.

E. Chemical Resistance: ASTM F925; pass.

2.7 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.

2.8 PRIMER FOR CONCRETE SUBFLOORS:

A. Provide in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.9 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.

2.10 CLEANERS:

A. Cleaners: As recommended in writing by floor tile manufacturer.

2.11 MOULDING:

A. Provide tapered mouldings of vinyl 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.
   1. Description: 1-1/4-inch-wide by 1/8-inch-thick by 25-foot-long resilient transition profile beveled along one edge.
   2. Basis-of-Design: Johnsonite, a Tarkett Company; RRS-XX-D: www.tarkettna.com.

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 directly 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.
   1. Remove existing resilient flooring and existing adhesive.

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 1/2 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 of 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 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.

3.6 CLOSEOUT ACTIVITIES

A. Demonstration and Training Session: Schedule and conduct with the Owner's maintenance staff. Session shall include instruction on the care and use of the installed flooring by representative(s) of the flooring manufacturer(s) – and actual use of the required cleaning equipment by all in attendance. Record names and job descriptions of attendees and submit with agenda as a Closeout Submittal. At the end of the session, participants shall be able to:

1. Select the proper cleaning chemicals, equipment, tools, and materials.
2. Identify the best practices and proper methodologies for floor maintenance.
3. Explain how to clean in ways that maintain flooring appearance and extend flooring life.

- - - E N D - - -

SECTION 09 65 36
STATIC-CONTROL RESILIENT FLOORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Static-dissipative, vinyl sheet floor covering.

1.02 RELATED REQUIREMENTS

A. Section 09 05 16 – Subsurface Preparation for Floor Finishes.

B. Section 09 65 13 - Resilient Base and Accessories for resilient base and other accessories installed with static-control resilient flooring.

C. Section 09 65 16 - Resilient Sheet Flooring for reducer strips and other accessories installed with static-control resilient flooring.

1.03 REFERENCE STANDARDS

A. American Association of Textile Chemists and Colorists (AATCC):
   1. AATCC-134 - Electrostatic Propensity of Carpets.

B. ASTM International:
   1. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring.
   2. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   3. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing.
   4. ASTM F1516 - Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (When Recommended).
   5. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   6. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-Situ Probes.

C. Federal Standard (FED STD):
   1. FED STD 101C/4046.1 - Test Procedures for Packaging Materials: Method 4046.1 - Electrostatic Properties of Materials, Revision C, Change Notice 1, October 8, 1982.

D. National Fire Protection Association (NFPA):
   1. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to static-control resilient flooring including, but not limited to, the following:
      a. Examination and preparation of substrates to receive static-control resilient flooring.
      b. Installation, including seamless installation techniques.

1.05 SUBMITTALS

A. Product Data: For each type of product.

B. Moisture, Alkalinity and Adhesion (Bond) Testing: The subcontractor shall, as a conditional precedent, test and inspect flooring substrate prior to installation of flooring material. Provide floor plans with the following indicated:

1. Date of testing.
2. Type of test performed.
3. Graphic location of each test.
4. Results of each test cross-referenced to the floor plan.

C. Shop Drawings: For each type of static-control resilient flooring. Provide computer-generated floor plan with seaming diagram. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.
   2. Submit grounding diagram showing location of grounding strips and connections.

D. Samples for Initial Selection: For each type of static-control resilient flooring.

E. Samples for Verification: For each type of static-control resilient flooring, of size indicated below:
   1. Sheet Floor Covering: 6- by 9-inch sections of floor covering.
   2. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9-inches long, of each color required.

F. Seam Samples: For seamless-installation technique indicated and for each static-control resilient flooring product, color, and pattern required; with seam running lengthwise and in center of 6- by 9-inch. Sample applied to a rigid backing and prepared by Installer for this Project.

G. Product Schedule: For static-control resilient flooring. Use same designations indicated on Drawings.

H. Qualification Data: For Installer.

I. Test Reports: Moisture, Alkalinity and Adhesion (Mat Bond) Testing.
   1. The subcontractor shall, as a conditional precedent, test and inspect flooring substrate prior to installation of flooring material.
   2. Provide floor plans with the following indicated:
      a. Date of testing.
      b. Type of test performed.
      c. Graphic location of each test.
      d. Results of each test cross-referenced to the floor plan.
   3. Tests performed by a qualified testing agency, for static-control resilient flooring.

J. Field quality-control reports.

K. Maintenance Data: For each type of static-control resilient flooring to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for static-control resilient flooring and seaming method.
   1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Mock-Ups: Build Mock-Ups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build Mock-Ups for static-control resilient flooring including integral-flash-cove base at external corner (with butterfly), welded seam, and accessories.
   a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations indicated.
2. Approval of Mock-Ups does not constitute approval of deviations from the Contract Documents contained in Mock-Ups unless COR specifically approves such deviations in writing.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store static-control resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer but not less than 50 degrees Fahrenheit or more than 90 degrees Fahrenheit.
   1. Sheet Floor Covering: Store rolls upright.

1.08 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degree F or more than 85 degree F, in spaces to receive static-control resilient flooring during the following time periods:
   1. 48 hours before, during, and after installation.
   2. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degree F or more than 95 degree F.
   3. Close spaces to traffic during static-control resilient flooring installation.
   4. Close spaces to traffic for 48 hours after static-control resilient flooring installation.
   5. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

1.09 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Sheet Floor Covering: Furnish not less than 10 linear feet for every 100 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of sheet floor covering installed.
   2. Weld Thread: Furnish quantity not less than 10 linear feet for every 100 linear feet or fraction thereof, for each color and pattern of weld thread installed.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Static-Dissipative Properties: Provide static-control resilient flooring with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
   1. Electrical Resistance: Test per ASTM F150 with 100-V applied voltage.
      a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.

b. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
c. Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
d. Static Decay: 5000 to zero V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.

2.02 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

A. Static-Dissipative, Vinyl Sheet Floor Covering: ASTM F1303, Type II, Grade I, Class B (nonfoamed plastic backing).
   1. Thickness: Not less than 0.08 inch.
   2. Size: Manufacturer's standard roll width and length.
   3. Seaming Method: Heat welded.
   4. Colors and Patterns: See Finish Legend.

2.03 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified Portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.

C. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.

D. Seamless-Installation Accessories:
   1. Heat-Welding Bead: Solid-strand product of manufacturer for heat welding seams.
      a. Color: As selected by COR from manufacturer's full color range to contrast with floor covering.
   2. Cove Strip: 1-inch radius support strip provided or approved by manufacturer.
   3. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.

E. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor-covering manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion or static-control characteristics of floor coverings.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to manufacturer's written instructions and with oversight by manufacturer's representative to ensure adhesion of static-control resilient flooring and electrical continuity of floor-covering systems.

B. Concrete Substrates: Prepare according to ASTM F710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with floor-covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test according to ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of three pounds of water per 1000 square feet in 24 hours.
   5. Perform relative-humidity test using in-situ probes according to ASTM F2170. Proceed with installation only after substrates have maximum 75 percent relative-humidity level measurement.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install static-control resilient flooring until it is same temperature as space where it is to be installed.
   1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

3.03 INSTALLATION, GENERAL

A. Install static-control resilient flooring according to manufacturer's written instructions and with oversight by manufacturer's representative.

B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.

C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other non-permanent, non-staining marking device.

F. Install static-control resilient flooring on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of static-control resilient flooring installed on covers. Tightly adhere static-control resilient flooring edges to substrates that abut covers and to cover perimeters.

G. Adhere static-control resilient flooring to substrates using a full spread of static-control 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.

H. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor-covering surfaces.
   2. Install metal corners at inside and outside corners.

3.04 SHEET FLOOR-COVERING INSTALLATION

A. Comply with manufacturer's written instructions for installing sheet floor coverings.

B. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out sheet floor coverings as follows:
   1. Maintain uniformity of sheet floor-covering direction.
   2. Minimize number of seams and place them in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor-covering substrates.
   3. Match edges of floor coverings for color shading at seams.
   4. Avoid cross seams.

3.05 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.
   1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.
   2. Arrange for testing of static-control resilient flooring before and after performing floor polish procedures.
   3. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.
   4. Prepare test and inspection reports.

3.06 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of static-control resilient flooring.

B. Perform the following operations immediately after completing static-control resilient flooring:
   1. Remove static-control adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect static-control resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. Do not wax static-control resilient flooring.
   2. If recommended in writing by manufacturer, apply protective static-control floor polish formulated to maintain or enhance floor covering's electrical properties; ensure static-control resilient flooring surfaces are free from soil, static-control adhesive, and surface blemishes.
      a. Verify that both floor polish and its application method are approved by manufacturer and that floor polish will not leave an insulating film that reduces static-control resilient flooring's effectiveness for static control.

D. Cover static-control resilient flooring until Substantial Completion.

– – – END – – –

SECTION 09 67 23.20
RESINOUS (URETHANE-BASED) WITH VINYL CHIP BROADCAST (RES-2)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies resinous (resinous urethane base coat with vinyl chip flake broadcast) flooring with integral cove base:
   1. Res-2 Resinous (urethane) vinyl chip flake broadcast flooring system.

1.2 RELATED WORK

A. Substrate Preparation for Floor Finishes: Section 09 05 16.
B. Color and location of each type of resinous flooring: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
C. 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. Sustainable Submittal:
   1. Product Data for products having recycled content, submit documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
      a. Include statements indicating costs for each product having recycled content.
   2. Product Data for field-applied, interior, paints, coatings, and primers, include printed statement of VOC content indicating compliance with environmental requirements.
E. Samples:
   1. Each color and pattern of resinous flooring specified in Section 09 06 00, SCHEDULE FOR FINISHES.

2. Samples for Verification: For each color and pattern of resinous flooring system required, 6 inches (152 mm) square, applied to a rigid backing.
3. Sample shall show cut-away construction from substrate to finish surface in thickness specified and color and pattern of finished surfaces. Finished flooring must match the approved samples in color and pattern.

F. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
1. Patterns.
2. Edge configurations.

G. Certifications and Approvals:
1. Manufacturer's certification of material and substrate compliance with specification.
2. Manufacturer's approval of installer.
3. Contractor's certificate of compliance with Quality Assurance requirements.

H. 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. Mock-Ups: Apply Mock-Up to determine Owner’s preferred level of slip-resistance/clean-ability, to verify selections made under sample submittals, to demonstrate aesthetic effects, and to establish quality standards for materials and execution.
1. Apply full-thickness Mock-Ups on 48 inch (1200 mm) square floor area selected by Contracting Officer’s Representative (COR).
   a. If applicable include 48 inch (1200 mm) length of integral cove base.
2. Approved Mock-Ups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
3. Sign off from COR on texture for slip resistance and clean-ability must be completed before installation of remaining flooring can begin.

E. Pre-Installation Conference:
1. Convene a meeting not less than 30 days prior to starting work.
2. Attendance:
   a. Contractor.
   b. 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 pattern and edge conditions.
f. Performance of the coating with chemicals anticipated in the area receiving the resinous (urethane 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 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 Project 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, 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 will be 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) during resinous flooring application and for not less than 24 hours after application.
2. Concrete substrate shall be properly cured per referenced section 03 30 00, CAST-IN-PLACE CONCRETE. Standard cure time a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade.
   a. Resinous flooring applications where moisture testing resulting in readings exceeding limits as defined in this specification under Part 3, Article 3.4, Paragraph B, shall employ a multiple-component 15-mil-thick system designed to suppress excess moisture in concrete.
   b. Application at a minimum thickness of 15 mils, over properly prepared concrete substrate as defined in Article 3.4.
   c. Moisture suppression system must meet the design standards as follows:

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	EPA and LEED	25 grams per liter
Permeance	ASTM E96 @ 16mils/ 0.4mm on concrete	0.1 perms
Tensile Modulus	ASTM D638	1.9×10^5psi
Percent Elongation	ASTM D638	12 percent
Cure Rate	Per manufacturer’s Product Data	4 hours tack free with 24 hour recoat window
Bond Strength	ASTM D7234	100-percent bond to concrete failure

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.

1.7 WARRANTY

A. Work subject to the terms of the Article “Warranty of Construction” FAR Clause 52.246-21.

B. Warranty: Manufacturer 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. Other Reference Standards from ASTM International:

C413 (2012).....Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C531 (2012).....Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

D638 (2010).....Tensile Properties of Plastics

D790 (2010).....Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D1308 (2013).....Effect of Household Chemicals on Clear and Pigmented Organic Finishes
D2240 (2010).....Rubber Property—Durometer Hardness
D4060 (2010).....Abrasion Resistance of Organic Coatings by the Taber Abraser
D4226 (2011).....Impact Resistance of Rigid (Poly-Vinyl Chloride) (PVC) Building Products
D7234 (2012).....Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
E96/E96M (2013).....Water Vapor Transmission of Materials
F1679.....Variable Incidence Tribometer for determining the slip resistance
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 FOR RES-2 (BROADCAST VINYL CHIP FLAKE)

A. System Descriptions:
   1. Monolithic, Multi-Component Urethane-Based Resinous Flooring system: Primer with broadcast quartz aggregates, high-performance multi-component solvent-free urethane undercoat, vinyl-chip flake broadcast media in desired flake size (1/8 inch), and high-performance multi-component urethane-based and solvent-free sealers.
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. Primer with broadcast quartz (primer coat):
   a. Resin: Urethane.
   b. Formulation Description: Multiple-component high solids.
   c. Application Method: Squeegee, back roll and broadcast.
   d. Thickness of Coat: 2-3 mils.
   e. Number of Coats: One.
   f. Aggregates: Quartz broadcast into wet urethane primer.
2. Undercoat (Body Coat):
   a. Resin: Urethane.
   b. Formulation Description: Pigmented multi-component, high solids.
   c. Application Method: Notched squeegee and back roll.
   d. Number of Coats: One.
   e. Aggregates: Vinyl chip flake broadcast into wet undercoat.
   f. Thickness of Coat: 20-30 mils.
   g. Number of Coats: One.
3. Sealer coat:
   a. Resin: Urethane.
   b. Formulation Description: Multiple-component high solids, solvent-free, UV-stable.
   c. Type/Finish: Clear Gloss.
   d. Thickness of Coat(s): 2-3 mils.
   e. Number of Coats: (2) two.
   f. Application: Squeegee and finish roll.

D. System Characteristics:

1. Color and Pattern: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Integral Cove Base: 1 inch (25.4 mm) radius urethane mortar cove keyed into concrete substrate and/or resinous flooring mortar system. No-fillers integral cove base shall be troweled in place with specified resinous mortar and then flaked.
3. Overall System Thickness: Nominal 2 to 3 mm.
4. Finish: Slip-resistance and clean-ability as determined by COR during Mock-Up. Slip-resistant texture is not required for the integral cove base.

5. Temperature Range: Systems vary by manufacturer; approximate range from a minimum of 45 to 150 degrees F.

E. Physical Properties:

1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Tensile Strength	ASTM D638	5,200 psi
Volatile Organic Compound (V.O.C.) Limits	EPA and LEED	Below 100 grams per liter
Flexural Strength	ASTM D790	4,000 psi
Water Absorption	ASTM C413	0.056 percent
Coefficient of Friction Dry / Slip Index Wet	ASTM F1679	>0.79 dry >0.65 wet
Impact Resistance	ASTM D4226	> 160 inch-pounds
Abrasion Resistance	ASTM D4060 CS-17	0.03 gram maximum weight loss
Thermal Coefficient of Linear Expansion	ASTM C531	17×10^{-6} inch per inch per degree Fahrenheit
Hardness - Shore D	ASTM D2240	85 to 90
Bond Strength	ASTM D7234	100-percent bond to concrete failure

F. Chemical Resistance (per ASTM D1308): No effect to the following exposures.

1. Acetic acid (5%)
2. Ammonium hydroxide (10%)
3. Citric Acid (50%)
4. Fatty Acid
5. Motor Oil, 20W
6. Hydrochloric acid (20%)
7. Sodium Chloride
8. Sodium Hypochlorite (10%)
9. Sodium Hydroxide (30%)
10. Sulfuric acid (25%)
11. Urine, Feces
12. Hydrogen peroxide (10%)

2.2 SUPPLEMENTAL MATERIALS

A. Textured Top Coat: Type recommended or produced by manufacturer of seamless resinous flooring system with slip-resistance and

clean-ability as determined by COR during Mock-Up. Slip-resistant texture is not required for the integral cove base.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.

C. Waterproof Membrane: Type recommended or produced by manufacturer of resinous floor coatings for type of service and conditions as indicated in Drawings.

D. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous flooring for conditions as indicated in Drawings.

E. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, and the like.

F. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resin-based materials only. Cementitious or single-component product will not be acceptable.

2.3 BASE CAP STRIP (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where monolithic resinous system with integral cove base is to be installed with the 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 Article 3.4, Paragraph 3.

3.2 PROJECT CONDITIONS

A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F (21 and 32 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 75 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 COR for the seamless resinous (urethane mortar) 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 pH-neutral 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 follows:
   a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re-circulates the shot by vacuum pickup.
2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
3. Verify that concrete substrates are dry.
   a. Perform in-situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.
   b. 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’s recommended joint fill material, and concrete crack treatment.

F. Prepare wall to receive integral cove base:
   1. Verify wall material is acceptable for resinous flooring application, if not, install cement board to receive integral cove base.
   2. Fill voids in wall surface to receive integral cove base, install waterproofing membrane as recommended by resinous flooring manufacturer.
   3. Install integral cove base prior to flooring if required by resinous flooring manufacturer.
   4. Grind, cut, or sand protrusions to receive integral cove 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 inter-coat adhesion.
   2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

B. Areas to Receive Integral Cove Base: Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply Integral Cove Base: Trowel to wall surfaces at a 1-inch radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, undercoating, flaking, and top coating of integral cove base. Round internal and external corners.

D. Areas to Receive Resinous Flooring: Apply primer over prepared substrate at manufacturer's recommended spreading rate.

E. Trowel Mortar Base Coat: Mix mortar material according to manufacturer's recommended procedures. Climatic and non-climatic resinous flooring systems might vary slightly on mode of application. Application shall be based upon the following: Uniformly spread mortar

over substrate using a specially designed screed box adjusted to manufacturer's recommended height. Metal trowel (hand or power) single-mortar coat in thickness indicated for flooring system; grout to fill substrate voids. When cured, sand to remove trowel marks and roughness.

F. Broadcast: Immediately broadcast quartz silica aggregate into the primer using manufacturer's spray caster. Strict adherence to manufacturer's installation procedures and agreed-upon coverage rates is imperative.

G. Under Coat: Mix integral cove base material according to manufacturer's recommended procedures. Uniformly spread mixed material over previously primed substrate using manufacturer's installation tool. Roll material with strict adherence to manufacturer's installation procedures and agreed-upon coverage rates.

H. Broadcast: Immediately broadcast vinyl flakes into the body coat. Strict adherence to manufacturer's installation procedures and agreed-upon coverage rates is imperative.

I. First Sealer: Remove excess un-bonded flakes by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.

J. Second Sealer: Lightly sand first sealer coat. Mix and apply second sealer coat with strict adherence to manufacturer's installation procedures.

3.6 TOLERANCE

A. From Line of Plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and integral cove 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.

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. Provide 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, or where 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 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. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Color, pattern, type, direction of hanging and areas to receive wall covering: 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. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. 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.

D. Manufacturer's Certificates:

1. Compliance with WA W-101.
2. Wall covering manufacturer's approval of adhesive.

E. 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.

F. Tests: Substrate moisture.

1.4 QUALITY ASSURANCE:

A. Finish one complete wall (full height, not less than 2438 mm (8 feet) in length) of each type (color and pattern) of wall covering showing specified colors and patterns.

B. After Contracting Officer Representative (COR) approval, the sample installation will serve as a standard for work throughout the Project.

1.5 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.

1.6 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

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 de-lustered 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. WC-1: Type II (Medium Duty).

E. WC-2: Type III (Heavy 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-resistant, mildew-resistant and germicidal-inhibiting type recommended by wall covering manufacturer for use on substrate to receive wall covering.

2.3 WALL LINER:

A. Provide a non-woven polyester cellulose blend having a minimum weight of 0.125 Kg/square meter (3.7 ounces per square yard) and a total minimum thickness of 0.325 mm (0.013 inches). Wall liner is to have a flame spread rating of 0-20 and smoke development rating of 0-25 when tested in accordance with ASTM E84.

2.4 EDGE GUARDS OR WAINSCOT CAP TRIM (NOT USED)

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 candela 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 Project 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. Do not proceed until discovered defects have been corrected by other trades and surfaces are ready to receive wall covering.
C. 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 work table 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. Do not double cut seams on wall unless specified.
   5. If double-cutting on the wall is necessary, place a 3-inch–wide 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 84 33
SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies the requirements for fabric covered acoustical wall panels.

1.2 RELATED WORK:

A. Color and location for hanging: 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: Fabric covering as specified in Section 09 06 00, SCHEDULE FOR FINISHES, size 457 mm (18 inches). Submit four (4) each, full width of mill run for each color specified.

C. Manufacturer's Literature and Data: Complete instructions for installation of wall panels. Include fabric facing, panel edge, core material, and acoustical data for each sound-absorbing wall unit.

D. Certificate: Flame spread and smoke development indices.

1.4 APPLICABLE PUBLICATIONS:

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

B. American Association of Textile Chemists and Colorists (AATCC):
TM 16-04.....Test Method: Colorfastness to Light

C. ASTM International (ASTM):
C423-09a.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
C612-14.....Standard Specification for Mineral Fiber Block and Board Thermal Insulation
D5034-09(R2013).....Breaking Strength and Elongation of Textile Fabrics (Grab Test)
E84-14.....Surface Burning Characteristics of Building Materials

D. Underwriter’s Laboratory (UL):

723-10(R2013).....Test for Surface Burning Characteristics of Building Materials

PART 2 - PRODUCTS

2.1 WALL COVERING PANELS:

A. Width: 610 mm (2 feet) unless shown otherwise on Construction Documents. End filler panels may vary in width as necessary to cover wall-to-wall installation.

B. Height:

1. For full-height panels, field-measure panels for custom fit flush to ceiling and tolerance at floor to within 3 mm (1/8-inch) at top of base.
2. As indicated on Construction Documents.

C. Thickness: As required to meet the indicated NRC range but not less than 25 mm (1 inch) nominal.

D. Fabric Covering:

1. Seamless non-woven, embossed texture, needle-punched 100-percent polyester, minimum 0.034 kg per linear meter (11 ounces per linear yard).
   a. Tear Strength: A minimum 110 N (25 pounds) machine direction and minimum 178 N (40 pounds) cross-machine direction.
   b. Tensile Strength: A minimum 220 N (50 pounds) machine direction and minimum 330 N (75 pounds) cross-machine direction in accordance with ASTM D5034.
2. Provide fabric covering stretched free of wrinkles and then bonded to the edges and back or bonded directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. Light fastness (fadeometer) is to be not less than 40 hours in accordance with AATCC TM 16.

E. Fabric Covering at Health Care Areas: In addition to that indicated above, provide fabric that is flame resistant, stain resistant, and antimicrobial. Fabric shall be cleanable with water or solvent based cleaning agents or diluted household bleach.

F. Fire-resistance rating for the complete composite system: Class A, 200 or less smoke density and flame spread less than 25 when tested in accordance with ASTM E84 or UL 723. Identify products with appropriate markings of testing agency.

G. Substrate: Fiberglass board per ASTM C612, Type 1A or Types 1A and 1B; density as specified, unfaced, dimensionally stable, molded rigid board.

H. Nominal Core Density: Between six and seven pounds per cubic foot.

1. Exception: For units also indicated as “tackable,” laminate a 1/8-inch thick layer of fiber glass board (with a density of between 16 and 20 pounds per cubic foot) to the outer face of the core.

I. Noise Reduction Coefficient (NRC) Range: 0.80-0.90 in accordance with ASTM C423.

J. Edge Construction: Manufacturer’s standard chemically hardened core with no frame.

K. Edge Detail: As indicated on Drawings.

L. Mounting acoustical panels are to be mounted by manufacturer’s standard two-part metal “Z” clips.

PART 3 - EXECUTION

3.1 WALL PREPARATION:

A. Walls shall be clean, smooth, and oil free, contain no protrusions, and be prepared in accordance with manufacturer’s printed instructions.

3.2 INSTALLATION:

A. Comply with manufacturer’s written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

B. Locate panels as shown on Construction Documents.

C. Unless indicated otherwise, install units with vertical surfaces and edge plumb, top edges level, and in alignment with other units. Install faces flush, and scribed to fit adjoining work accurately at borders and at penetrations. Variation from plumb and level installation are to be no more than 1.6 mm in 1200 mm (1/16 inch in 48 inches).

3.3 CLEANING:

A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer’s written instructions.

B. Panels that are damaged, discolored, or improperly installed shall be removed and new panels shall be provided as directed by Contracting Officer Representative (COR).

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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 of this Project Manual.
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 galvanized ferrous metals exposed to view.
6. Painting gypsum drywall exposed to view.
7. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications.
8. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports, and other mechanical and electrical items and equipment exposed to view.
9. Painting surfaces above, behind, or below grilles, gratings, diffusers, louvers, lighting fixtures, and the like, which are exposed to view through these items.
10. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
11. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory-finished items.
12. 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, shall be included as though specified.

1.2 RELATED WORK:

A. Activity Hazard Analysis: Section 01 35 26, SAFETY REQUIREMENTS.

B. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.

C. Shop-prime-painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS; Division 10 - SPECIALTIES; Division 12 - FURNISHINGS; 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. Contractor Option: Prefinished flush doors with transparent finishes: Section 08 14 00, INTERIOR WOOD DOORS.

E. 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. Sustainable Design Submittals as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Painter qualifications.

D. Manufacturer's Literature and Data:

1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name, and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one (1) list may be used for the entire contract and each coating system shall be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

E. 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. Panel to Show Transparent Finishes: Wood of same species and grain pattern as wood approved for use, 100 x 250 mm (4- x 10-inch face) minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 x 50 mm (2 x 2 inch) minimum or actual wood member to show complete finish.
4. Attach labels to panel stating the following:
   a. Federal Specification Number or manufacturers name and product number of paints used.
   b. Specification code number specified.
   c. Product type and color.
   d. Name of project.
5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.

F. Sample of identity markers if used.

G. Manufacturers' Certificates indicating compliance with specified requirements:
   1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
   2. High-temperature aluminum paint.
   3. Epoxy coating.

1.4 DELIVERY AND STORAGE:

A. Deliver materials to Project site in manufacturer's sealed container marked to show following:
   1. Name of manufacturer.
   2. Product type.
   3. Batch number.
   4. Instructions for use.
   5. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:
   1. Federal Specification Number, where applicable, and name of material.
   2. Surface upon which material is required to be applied.
   3. Specify Coat Types: Prime; body; finish; etc.

C. 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.

D. Store materials at Project 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. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.

B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are required 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 MOCK-UP PANEL:

A. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 3.05 m (10 feet) wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the COR. Paint mock-ups to include one (1) door and frame assembly.

B. Finish and texture approved by COR will be used as a standard of quality and workmanship for remainder of work.

C. Repaint individual areas which are not approved, as determined by the COR, until approval is received.

1.7 REGULATORY REQUIREMENTS:

A. Paint materials shall 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 shall 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.

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.

1.8 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 shall 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.

1.9 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. Master Painters Institute (MPI):

1.....Aluminum Paint

8.....Exterior Alkyd, Flat MPI Gloss Level 1

9.....Exterior Alkyd Enamel MPI Gloss Level 6

10.....Exterior Latex, Flat

11.....Exterior Latex, Semi-Gloss

18.....Organic Zinc Rich Primer

22.....Aluminum Paint, High Heat (up to 590% - 1100F)

31.....Polyurethane, Moisture Cured, Clear Gloss

36.....Knot Sealer

43.....Interior Satin Latex, MPI Gloss Level 4

44.....Interior Low Sheen Latex, MPI Gloss Level 2

45.....Interior Primer Sealer

46.....Interior Enamel Undercoat

47.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5

48.....Interior Alkyd, Gloss, MPI Gloss Level 6

50.....Interior Latex Primer Sealer

51.....Interior Alkyd, Eggshell, MPI Gloss Level 3

52.....Interior Latex, MPI Gloss Level 3

53.....Interior Latex, Flat, MPI Gloss Level 1

54.....Interior Latex, Semi-Gloss, MPI Gloss Level 5

66.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved)

67.....Interior Latex Fire Retardant, Top-Coat (ULC Approved)
71.....Polyurethane, Moisture Cured, Clear, Flat
77.....Epoxy Cold Cured, Gloss
79.....Marine Alkyd Metal Primer
90.....Interior Wood Stain, Semi-Transparent
91.....Wood Filler Paste
95.....Fast Drying Metal Primer
98.....High Build Epoxy Coating
101.....Epoxy Anti-Corrosive Metal Primer
108.....High Build Epoxy Coating, Low Gloss
114.....Interior Latex, Gloss
134.....Galvanized Water Based Primer
135.....Non-Cementitious Galvanized Primer
138.....Interior High-Performance Latex, MPI Gloss Level 2
139.....Interior High-Performance Latex, MPI Gloss Level 3
140.....Interior High-Performance Latex, MPI Gloss Level 4
141.....Interior High-Performance Latex (SG) MPI Gloss Level 5

G. 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

H. U.S. National Archives and Records Administration (NARA):
29 CFR 1910.1000.....Air Contaminants

I. 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. Flat Paints and Coatings: 50 g/L.
2. Non-flat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.

E. VOC test method for paints and coatings shall 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 in Section 09 06 00, SCHEDULE FOR FINISHES or specified.

B. Pressure-sensitive adhesive back.

C. Widths as shown on Construction Documents.

2.4 BIO-BASED CONTENT

A. Paint products shall comply with following bio-based standards for bio-based materials:

Material Type	Percent by Weight
Interior Paint	20 percent bio-based material
Exterior Paint	20 percent bio-based material
Wood Stain	39 percent bio-based content
Polyurethane Coatings	25 percent bio-based content
Wood Sealer	11 percent bio-based content
Wood Sealer- Penetrating Liquid	79 percent bio-based content

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

PART 3 - EXECUTION

3.0 EXAMINATION

A. In areas requiring new work and patching, verify existing finishes shown in the finish schedule and on the plans. Immediately call any discrepancies to the COR's attention. New wall and ceiling finishes shall match the existing finishes, unless otherwise noted.

1. For existing ceiling patching, where ceiling is cut out or portions removed for removal of existing devices or installation of new work, the disturbed portion shall be patched to match the existing ceiling finish. Unless otherwise noted, the entire ceiling area shall be repainted where ceilings are gypsum board.
2. Freestanding columns in a room shall receive the same finish as the room wall, unless otherwise noted.
3. Where new finishes are applied to existing, the existing finishes shall be removed and/or the existing surfaces prepared as required to receive new finishes, unless otherwise noted. Where required to accommodate the new finishes, the mechanical, plumbing, and electrical trades shall disconnect and remove their respective devices and items from the existing wall or ceiling and relocate to their final position in the new construction. Such devices shall include but not be limited to electrical switches, panels, outlets, thermostats, grilles, plumbing fixtures, medical gas outlets, and the like. The respective trade shall also be responsible for any permanent connections of those items which are relocated.

4. Where wall surfaces are patched to match the existing, the new finish shall be applied to the nearest corner or break in the wall plane, unless otherwise noted.
5. Where existing walls are intended to receive a new finish, any existing painted items in or on the wall (doors, door frames, electrical panels, and the like) shall be repainted to match or coordinate with the new finish, unless otherwise noted.
6. Gypsum board walls in an existing building from which vinyl wall fabric is removed, shall be cleaned of all adhesive and a skim coat of plaster shall be applied to receive the new finish.
7. In rooms scheduled to receive new finishes or millwork that is required to receive new finishes, existing fixtures, devices, hardware, and accessories shall be temporarily removed as required to allow the new finish to extend under or behind the fixture or accessory and then reset.

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-site at end of each day’s work.

B. Atmospheric and Surface Conditions:
   1. Do not apply coating when air or substrate conditions include:
      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 shall application conditions 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.
6. Varnishing:
   a. Apply in clean areas and in still air.
   b. Before varnishing vacuum and dust area.
   c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 INSPECTION:

A. Examine the areas and conditions where painting and finishing are required 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 shall 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 shall 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 shall 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 shall be dry to manufacturer’s recommendations before applying succeeding coats.

I. After the application of the first coat, all suction spots or “hot spots” in gypsum shall be touched up before applying the second coat.

J. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

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 shall 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. 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. Wood:

1. Sand to a smooth even surface and then dust off.
2. Sand surfaces showing raised grain smooth between each coat.
3. Wipe surface with a tack rag prior to applying finish.

4. Surface painted with an opaque finish:
   a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
   b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions, and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
7. Fill open-grained wood such as oak, walnut, ash, and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
   a. Thin filler in accordance with manufacturer's instructions for application.
   b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.

C. 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 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-primed 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.

D. Zinc-Coated (Galvanized) Metal, and Aluminum 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.

E. Gypsum Board:
1. Remove efflorescence, and loose or 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 09 29 00 (“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. Mix two-component and two-part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.

E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 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 applications of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.
E. Apply by brush or roller. Spray application for new or existing occupied spaces only upon approval by acceptance from COR in writing.
   1. Apply painting materials specifically required by manufacturer to be applied by spraying.
   2. In new construction and in existing occupied spaces, where paint is applied by spray, mask or enclose with polyethylene, or similar air-tight material with edges and seams continuously sealed, including items specified in “Building and Structural Work Field Painting”; “Work not Painted”; motors, controls, telephone, and electrical equipment, fronts of sterilizers, and other recessed equipment and similar prefinished items.
F. Do not paint in closed position operable items 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.
D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.
E. Wood and Wood Particleboard:
   1. Use same kind of primer specified for exposed face surface.
      a. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
      b. Transparent finishes as specified under “Transparent Finishes on Wood Except Floors Article”.

2. Apply one (1) coat of sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to Project site to surfaces of unfinished woodwork, except concealed surfaces of shop-fabricated or -assembled millwork and surfaces specified to have varnish, stain, or natural finish.

F. Metals:
1. Steel and Iron: Use MPI 101 (Cold Curing Epoxy Primer) where finish is specified.
2. Zinc-Coated Steel and Iron: MPI 134 (Waterborne Galvanized Primer).
3. Aluminum Scheduled to be Painted: MPI 95 (Fast Drying Metal Primer).
4. Machinery Not Factory-Finished: MPI 9 (Exterior Alkyd Enamel).
5. Asphalt-Coated Metal: MPI 1 (Aluminum Paint).

G. Gypsum Board and Hardboard:
1. Surfaces Scheduled to Have MPI 53 (Interior Latex, Flat, MPI Gloss Level 1); MPI 52 (Interior Latex, MPI Gloss Level 3); or MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5) Finish: Use MPI 53 (Interior Latex, MPI Gloss Level 1); MPI 52 (Interior Latex, MPI Gloss Level 3); and MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5), respectively.
2. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) in shower and bathrooms.
3. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 77 (Epoxy Cold Cured, Gloss), MPI 98 (High Build Epoxy Coating), or MPI 108 (High Build Epoxy Marine Coating) finish.

3.8 EXTERIOR FINISHES:

A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Wood:
1. Do not apply finish coats on surfaces concealed after installation.
2. Two (2) coats of MPI 10 Exterior Latex, Flat) on exposed surfaces, except where transparent finish is specified.
3. Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat) for transparent finish.

C. Steel and Ferrous Metal:
1. Two (2) coats of MPI 94 (Exterior Alkyd, Semi-Gloss) on exposed surfaces.

D. Machinery without factory finish except for primer: One (1) coat MPI 94 (Exterior Alkyd, Semi-Gloss).

E. Concrete Masonry Units and Brick: (Not Used)

3.9 INTERIOR FINISHES:

A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
   a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) unless specified otherwise.
   b. Machinery without factory finish except for primer: One (1) coat MPI 9 (Exterior Alkyd Enamel).

C. Gypsum Board:

1. One (1) coat of MPI 50 (Interior Latex Primer Sealer) plus one (1) coat of MPI 139 (Interior High-Performance Latex, MPI Gloss level 3).

3.10 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. In existing rooms and areas where alterations occur, clean existing stained and natural finished wood, retouch abraded surfaces, and then give entire surface one (1) coat of MPI 71 (Polyurethane, Moisture Cured, Clear Flat).

G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
H. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.
I. Sand or dull glossy surfaces prior to painting.
J. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.11 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.

3.12 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 after tests have been completed.
E. Omit prime coat from factory prime-coated items.

F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.

G. Omit field painting of items specified in “BUILDING AND STRUCTURAL WORK FIELD PAINTING”; “Building and Structural Work Not Painted”.

H. Color:

1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
   a. White: Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
   b. Gray: Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
   c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
   d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
   e. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.

I. Apply paint systems on properly prepared and primed surface as follows:

1. Exterior Locations:
   a. Apply two (2) coats of MPI 8 (Exterior Alkyd, Flat) to the following ferrous metal items:
      Vent and exhaust pipes with temperatures under 94 degrees C (201 degrees F), roof drains, exposed piping, and similar items.
   b. Apply two (2) coats of MPI 10 (Exterior Latex, Flat) to galvanized and zinc-copper alloy metal.

2. 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, 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 8 (Exterior Alkyd, Flat) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.
3. Other exposed locations:
   a. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One (1) coat of MPI 50 (Interior Latex Primer Sealer) and one (1) coat of MPI 10 (Exterior Latex, Flat).

3.13 BUILDING AND STRUCTURAL WORK FIELD PAINTING:

A. Painting and finishing of interior and exterior work except as specified here-in-after.
   1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
   2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
   3. Painting of ferrous metal and galvanized metal.
   4. Painting of wood with fire retardant paint exposed in attics, when used as mechanical equipment space (except shingles).
   5. Identity painting and safety painting.
B. Building and Structural Work Not Painted:
   1. Prefinished items:
      a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
      b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.

2. Finished surfaces:
   a. Hardware except ferrous metal.
   b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
   c. Signs, fixtures, and other similar items integrally finished.
3. Concealed surfaces:
   a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
   b. Inside walls or other spaces behind access doors or panels.
   c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
   a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
   b. Tracks for overhead or coiling doors, shutters, and grilles.
5. Labels:
   a. Code required label, such as Underwriters Laboratories Inc., Intertek Testing Service or Factory Mutual Research Corporation.
   b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
   a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
   b. Gas Storage Racks.
   c. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Exterior exposed foundations walls.
10. Face brick.
11. Structural steel encased in concrete or other enclosure.
12. Structural steel to receive sprayed-on fire proofing.

3.14 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.
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
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
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
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
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
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.

8. See Sections for methods of identification, legends, and abbreviations of the following:
   a. Laboratory gas 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. 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.
   c. 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.

C. Identify columns in pipe basements and interstitial space:
   1. Apply stenciled number and letters to correspond with grid numbering and lettering indicated on construction documents.
   2. Paint numbers and letters 101 mm (4 inches) high, locate 45 mm (18 inches) below overhead structural slab.
   3. Apply on four (4) sides of interior columns and on inside face only of exterior wall columns.
   4. Color:
      a. Use black on concrete columns.
      b. Use white or contrasting color on steel columns.

3.15 PROTECTION CLEAN UP, AND TOUCH-UP:

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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SECTION 10 11 20
CUSTOM-PRINTED GLASS MARKERBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes fixed, glass, dry-erase markerboards with custom graphics.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer’s Product Data.

B. Shop Drawings: Include elevations and details showing attachment hardware.

C. Manufacturer’s Instructions:
   1. Installation instructions.
   2. Cleaning instructions:

D. Closeout Submittals:
   1. Operation and maintenance data.
   2. Warranty Documentation: Submit manufacturer’s standard warranty.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Provide safety glass complying with testing requirements in Category I of the Consumer Product Safety Commission's (CPSC's) Safety Standard for Architectural Glazing Materials (Title 16, Part 1201 of the Code of Federal Regulations (16 CFR 1201)).

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to Project site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. 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.
      a. Do not expose product to extreme temperatures. Store inside a climate-controlled environment with low-humidity and a temperature range between 30 and 95 degrees Fahrenheit.
   4. Protect materials during storage, handling, and installation to prevent damage.

1.05 SITE CONDITIONS

A. Ambient Conditions: Room temperature and humidity shall be at normal occupancy levels during and after installation.

1.06 WARRANTY

A. Warranty Period: Two years.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Clarus Glassboards LLC, 8715 Harmon Rd, Fort Worth, TX 76177. Voice: 888-813- 7414. Facsimile: 682-626-5344. Website: www.clarusglassboards.com. E-mail: info@clarusglassboards.com.

B. Krystal Writing Boards, Inc., 1330 Lincoln Avenue, Unit 7, Holbrook, NY 11741. Voice: 631-714- 4700. Website: www.krystalgwb.com. E-mail: charlie@krystalgwb.com.

C. On-Site Systems, 470 Satellite Boulevard, Suite A, Suwanee, GA 30024. Voice: 800-838-7778. Website: www.on-sitesystems.com. E-mail: rich@on-site-systems.com.

D. Skyline Design, 1240 North Homan Avenue, Chicago, IL 60651. Voice: 888-278-4660. Facsimile: 773-278-3548. Website: www.skydesign.com. E-mail: sales@skylinedesign.com.

2.02 FIXED MARKERBOARDS

A. Fixed, Glass, Dry-Erase Markerboards:
   1. Shop-fabricated.
   2. Size: See Drawings.
   3. Components (back to front):
      a. Color(s): See Finish Legend.
      b. Custom Graphics: See Drawings.
      c. Glass: Tempered, safety writing glass, eased edges.
         1) Thickness: See Drawings.
      d. Magnetic backing.

2.03 ACCESSORIES

A. Rare earth magnets with round or otherwise decorative shape.
   1. Quantity per Magnetic Board: Six.
   2. Minimum Diameter: 1 inch.
   3. Colors: One each in black, white, red, yellow, green, and blue.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install markerboards in accordance with manufacturer’s instructions at plan locations indicated on the approved Shop Drawings.

B. Install markerboards plumb, level, and square, at mounting height indicated on the approved Shop Drawings.

C. Mount markerboards securely in place with included stainless steel standoffs.

3.02 CLEANING

A. Clean markerboards promptly after installation in accordance with manufacturer’s instructions.

B. Do not use harsh cleaning materials or methods that could damage surface.

3.03 PROTECTION

A. Cover and protect installed markerboards from damage until Substantial Completion.

- - - END - - -

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies interior signage for room numbers, directional signs, code-required signs, and temporary signs.
   1. Signage proposed for this Project shall:
      a. Function as described in this Section and in the VA Salem Sign Standard Drawings.
      b. Match exact finishes and sizes of signs designed and specified for this Project and approved by the Department of Veterans Affairs (VA).
      c. Be in line with the VAMC’s continuing effort to move patients more efficiently throughout the hospital reducing stress on both patients and staff while increasing hospital efficiencies.

1.2 RELATED WORK:

A. Lighted EXIT signs for egress purposes are specified under Division 26, ELECTRICAL.

1.3 QUALITY ASSURANCE:

A. Project requires a combined environmental graphics design-build organization with significant experience in developing a large-scale interior signage/wayfinding scheme in a major medical center environment.
B. Manufacturer’s Qualifications: Provide signage that is the product of one manufacturer. Submit evidence of satisfying the following qualifications.
   1. Sign manufacturer shall have provided signage as specified for a minimum of three (3) years.
   2. Signs shall be manufactured in the United States of America.
   3. Signage shall be available from manufacturer under standard GSA warranties.
C. Installer’s Qualifications: Minimum three (3) years’ experience in the installation of signage of the type as specified in this Section. Submit installer’s qualifications.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Each submittal shall include:
   1. Name of Project.
   2. Sign Contractor’s name.
   3. Date submitted.

B. Sustainable Design Submittals, as described below:
   1. Certification of composite board back plate as an Environmentally Preferable Purchasing (EPP) downstream product.

C. Interior Sign Samples: Sign panels and frames, with letters and symbols, for each sign type.
   1. Sign Panel, 203 x 254 mm (8 x 10 inches), with letters.
   2. Color samples of each color, 152 x 152 mm (6 x 6 inches). Show anticipated range of color and texture.
   3. Sample of typeface, arrow, and symbols in a typical full-size layout.

D. Manufacturer's Literature:
   1. Showing the methods and procedures proposed for the anchorage of the signage system to each surface type.
   2. Manufacturer’s printed specifications and installation and maintenance instructions.

E. Delegated Design Submittal: Full report documenting general wayfinding theory, themes, and plan.
   1. Sign Message Schedule.
   2. Sign Location Plan(s), showing location, type, and total number of signs required.

F. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting, and finishes.

G. Full size layout patterns for dimensional letters.

H. Manufacturer’s qualifications.

I. Installer’s qualifications.

1.5 DELIVERY AND STORAGE:

A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.

B. Package to prevent damage or deterioration during shipment, handling, storage, and installation. Maintain protective covering in place and in good repair until removal is necessary.

C. Deliver signs only when the Project site and mounting services are ready for installation work to proceed.

D. Store products in dry condition inside enclosed facilities.

E. Protect products against damage during field-handling and installation.

1.6 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21, “Warranty of Construction”.

B. The Sign Contractor, by commencing the work of this Section, assumes overall responsibility, as part of the Contractor’s warranty of work, to assure that assemblies, components, and parts shown or required within the work of this Section, comply with the Contract Documents. The Contractor shall further warrant~~:~~ ~~T~~that all components~~,~~ specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

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. ASTM International (ASTM):

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)

C. Federal Specifications (Fed Spec):

MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified.

MIL-P-46144C.....Plastic Sheet, Polycarbonate

D. United States Department of Justice (USDoJ): 2010 ADA Standards for Accessible Design, September 15, 2010.

1.8 ADMINISTRATIVE REQUIREMENTS

A. Coordinate proposed signage with the VA according to facility demolition, renovation, and construction schedules.

PART 2 - PRODUCTS

2.0 MANUFACTURERS

A. Provide items as completed units produced by a single manufacturer. Specified Vendor (Joint Venture):
   1. Creative Signage System, Inc. 9101 51st Place College Park, MD 20740 P: 301-345-3700 E: creative@creativesignage.com.
   2. Sayres and Associates, 55 M St., SE, Suite 200, Washington, D.C. 20003 P: 202-355-0922 Extension 2109.

2.1 SIGNAGE GENERAL:

A. Provide signs of type, size, and design shown on the Construction Documents.
B. Provide signs complete with lettering, framing, and related components for a complete installation.
C. Provide graphic items as completed units, including necessary mounting accessories, fittings, and fastenings.
D. Do not scale Construction Documents for dimensions. Verify dimensions and coordinate with field conditions. Notify Contracting Officer Representative (COR) of discrepancies or changes needed to satisfy the requirements of the Construction Documents.
E. Components shall be made to complement the architecture and interior design themes currently being initiated using signage standards already designed and implemented (see VA Salem Sign Standard Drawings). New and modified components shall be oriented around current design themes.
F. Proposed products shall be non-proprietary items on GSA Schedule and readily available in the commercial market for ease in future procurement.

2.2 EXTERIOR SIGNAGE PERFORMANCE REQUIREMENTS (NOT USED)

2.3 INTERIOR SIGN MATERIALS:

A. Aluminum:
   1. Extrusions and Tubing: ASTM B221M (ASTM B221).
   2. Recycled Content: 75 percent.
B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matte-finished water white clear acrylic shall not be acceptable.
C. Adhesives:

1. Adhesive for Shop-Laminating Faceplate to Back Plate: Sta'-Put S200 High Strength Aerosol Adhesive by ITW Polymers Sealants North America.
   a. Shear strength, tack-resistance, and heat-resistance shall exceed that of pressure-sensitive adhesives.
2. Adhesive for Shop-Assembly of Aluminum Frame: Two-part epoxy.

2.4 EXTERIOR SIGN MATERIALS (NOT USED)

2.5 INTERIOR SIGN TYPES (STANDARDS / CONSTRUCTION)

A. The proposed interior signage shall meet federal, state, local, and VA requirements for safety and ADA compliance.

B. Conform to the VA Signage Design Guide (http://www.cfm.va.gov/til/spclRqmts.asp#SIGN).

C. Specifications Applicable to Signs in General:
   1. Type Styles: Arial Bold, and Arial as indicated on the VA Salem Sign Standard Drawings. Initial caps or all caps, as indicated in Sign Message Schedule.
   2. Arrow: Comply with graphic standards in Construction Documents.
   3. Letter spacing: Comply with graphic standards in Construction Documents.
   4. Provide text, arrows, and symbols in size, colors, typefaces, and letter spacing shown in Construction Documents. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in Construction Documents is for layout purposes only; final text for signs is listed in Sign Message Schedule.
   5. Finish and Contrast: Characters and background shall be eggshell, matte, or other non-glare finish and shall exhibit adequate contrast. Refer to the VA Salem Sign Standard Drawings. Background shall be off-white acrylic. Match function and design of signs designed and specified for this Project and approved by the VA.
   6. Interior signs shall be composed of a two-ply 1/16-inch-thick matte faceplate laminated to 1/8-inch-thick clear back plate with compound high-strength aerosol adhesive.
   7. Signs shall nest into a Type-OS22 custom-extruded, precision-mitered frame composed of clear-anodized **aluminum**. Assemble frame using two-part epoxy using back-plate made of composite board with recycled content.

a. **Composite back-plate shall be made of recycled content and be third-party certified as an Environmental Preferable Purchasing (EPP) downstream product** (to comply with the environmental criteria referenced in the USEPA's guidelines for environmentally preferable purchasing).

8. Signs / pockets shall be magnetically mounted in frame. .
9. Create pocket signs using No. 38 (0.080-inch) separating rib(s) to form insert space for custom computer-generated acetate with package results in 5-3/16-inch inserts and 2-1/16-inch inserts **(the use of adhesive strips instead of acrylic ribs is not acceptable).**
10. Use injection-molded acrylonitrile butadiene styrene (ABS) characters for the room number portion of the sign.
11. **Sign Color and Non-ADA Copy/Graphics: Subsurface-applied.**
    a. **Surface color or copy including laminates will not be acceptable**.
    b. Subsurface screen inks shall be equal to NAZ-DAR Industrial Lacquer #7200 –series with 2-Propoxyethanol CAS # 2807-30-9; 2-Butoxethanol CAS # 111-76-2; Isopropyl Alcohol CAS # 67-63-0; Toluene CAS#108-88-3 and shall match #6213 Jade with black text (HM).
12. Signage shall be accompanied by a software program with unlimited licenses that automatically scales the copy for the insert to fit each sign appropriately allowing signs to be updated in-house on any standard computer and printer while maintaining sign standards.

D. Permanent Rooms and Spaces:

1. Characters shall be accompanied by Grade-2 Braille.
    a. Produce Grade-2 Braille with high-pressure surface beading directly below tactile number (3/16-inch clear minimum). Braille translation shall utilize Duxbury Braille translator.
2. Tactile numbers, letters, and Braille characters, when required, shall be raised a minimum of 0.8 mm (1/32 inches) from the background surface.
3. Minimum Character Height: 16 mm (5/8 inch).
4. Maximum Character Height: 50 mm (2 inches).
5. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.

6. Identifications Signs:
   a. Size: 6-inch by 9-inch.
   b. Font: Arial in black.
   c. Background: Off white.
   d. Finish and Contrast: Signs shall match function and design of signs designed and specified for this Project.

E. Overhead Signs: Refer to VA Salem Sign Standard Drawings.
   1. Characters shall have a width- to- height ratio between 3:5 and 1:1.
   2. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
   3. Character Height: Minimum 75 mm (3 in) high for overhead signs. As shown, for directional signs.
   4. Finish and Contrast: Signs shall match function and design of signs designed and specified for this Project.
   5. Signs to have a solid wood accent.

F. Dimensional Letters and Numbers:
   1. Provide dimensional letters and numbers that are cut-out aluminum in size and thickness indicated in construction documents.
   2. Provide draft of letters and numbers perpendicular to letters face.
   3. Fabricate letters and numbers with square corners, such as where a letter stem and bar intersect.
   4. Paint letters and numbers with baked enamel.
   5. Pin-mount dimensional characters to substrate.

2.6 EXTERIOR SIGN TYPES (NOT USED)

2.7 FABRICATION:

A. Design interior signage components to allow for expansion and contraction for a minimum material temperature range of 56 degrees C (100 degrees F), without causing buckling, excessive opening of joints, or over-stressing of adhesives, welds, and fasteners.

B. Form work to required shapes and sizes, with true curved lines and angles. Provide necessary rebates, lugs, and brackets for assembly of units. Provide concealed fasteners wherever possible.

C. Shop-fabricate so far as practicable. Fasten joints flush to conceal reinforcement, or weld joints, where thickness or section permits.

D. Level and assemble contact surfaces of connected members so joints will be tight and practically unnoticeable, without applying filling compound.
E. Signs: Fabricate with fine, even texture. Signs shall be flat and sound.
   1. Maintain lines and miters sharp, arises unbroken, profiles accurate, and ornament true to pattern.
   2. Plane surfaces shall be smooth, flat, and without oil-canning, free of rack and twist.
   3. Maximum Variation from Plane of Surface: Plus-or-minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
F. Finish extruded members shall be free from extrusion marks. Fabricate with square turns, sharp corners, and true curves.
G. Finish hollow signs with matching material on all faces, tops, bottoms, and ends. Miter edge joints to give appearance of solid material.
H. Do not manufacture signs until final review of Sign Message Schedule and Sign Location Plan(s) has been completed by the COR and forwarded to Contractor.
I. Drill holes for bolts and screws. Mill smooth exposed ends and edges with corners slightly rounded.
J. Movable Parts, Including Hardware: Clean and adjust to operate as designed without binding or deformation of members. Center doors and covers in opening or frame.
   1. Align contact surfaces to fit tight and even without forcing or warping components.
K. Pre-assemble items in shop to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
L. Prime-paint surfaces as required. Apply finish coating of paint for complete coverage with no light or thin applications allowing substrate or primer to show.
   1. Finish surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter, and other imperfections.

PART 3 - EXECUTION

3.0 PREPARATION

A. Protect adjacent existing and newly placed construction and finishes as much as possible during installation to limit wall damage.

3.1 INSTALLATION:

A. Locate signs as shown on the Construction Documents and the Sign Location Plan(s).

B. Conform to the VA Signage Design Guide (http://www.cfm.va.gov/til/spclRqmts.asp#SIGN) for installation requirements.

C. At each sign location verify that there are no utility lines behind each sign location that will be affected by installation of signs.

   1. Correct and repair damage done to utilities during installation of signs at no additional cost to Government.

D. Provide inserts and anchoring devices that are required to be set in concrete or other material for installation of signs. Submit setting drawings, templates, instructions, and directions for installation of anchorage devices that might involve other trades.

E. Refer to Sign Message Schedule for mounting method. Mount signs in proper alignment, level and plumb, according to the Sign Location Plan(s) and the dimensions given on the elevation drawings. When exact position, angle, height, or location is not clear, contact COR for resolution.

   1. Wall-mounted signs shall be mechanically fastened to the wall with concealed screws and plugs.

F. When signs are installed on glass, provide blank glass back-up to be placed on opposite side of glass exactly behind sign being installed. Provide blank glass back that is the same size as sign being installed.

G. Touch-up exposed fasteners and connecting hardware to match color and finish of surrounding surface.

H. At completion of sign installation, clean exposed sign surfaces. Clean and repair adjoining or adjacent surfaces that became soiled or damaged as a result of installation of signs.

- - - END - - -

SECTION 10 21 23
CUBICLE CURTAIN TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies cubicle curtain track (C.C.T.), including hinged unit of track for safe loading and removing of curtain.

1.2 RELATED WORK:

A. Steel Shapes for Suspending Track Assembly: Section 05 50 00, METAL FABRICATIONS.

B. Acoustical Ceiling Panels 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: One clip anchor for fastening track to grid system of acoustical ceilings.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

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. American Association of Textile Chemists and Colorists (AATCC):
AATCC Test Method 16.3..Colorfastness to Light: Xenon-Arc.

C. ASTM International (ASTM):
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)

B456-11.....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

E2149-13A.....Standard Test Method for Determining the Antimicrobial Agents under Dynamic Contact Conditions.

D. Aluminum Association (AA):

DAF 45-09.....Designation System for Aluminum Finishes

E. American Architectural Manufacturers Association (AAMA):

2603-13.....Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

F. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

G. The National Fire Protection Association (NFPA):

NFPA 701 (2015).....Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS:

A. Channel Tracks (Surface-Mounted Type): Extruded aluminum, ASTM B221M (B221), Alloy 6063, Temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.

B. Curtain Carriers: Nylon carriers, with nylon wheels on metal or nylon axles.

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.

C. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.

D. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.

E. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Provide operating mechanism shall be removable with common tools.

1. At the free end of each run of track, provide the cubicle curtain track manufacturer’s hinged unit of track to allow for safe loading and removal of curtain onto and from the track without the use of a ladder or step-stool. This hinged unit of track, when lowered, shall bring the track end and curtains down to 4 feet above the finished floor so that the curtain can be removed from the carriers while standing on the floor.

a. Unit of track shall include hinge, locking unit, and latch.

b. Include one of the manufacturer’s release wands.

2.2. SHOWER CURTAIN TRACK (NOT USED)

2.3 INTRAVENOUS SUPPORT ASSEMBLY (NOT USED)

2.4 FASTENERS:

A. Exposed Fasteners, Screws, and Bolts: Stainless steel or chromium/nickel-plated brass.

B. Concealed Fasteners, Screws, and Bolts: Hot-dip galvanized. Exception in High-Moisture Areas: Use stainless steel.

C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical-panel 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.

2.5 FINISHES:

A. Aluminum: Finish numbers for aluminum specified are in accordance with AA DAF 45. AA-C22A31 finish, chemically etched medium matte with clear anodic coating, Class II Architectural, .01 mm (0.4 mils) thick.

B. Chrome/Nickel Plating: Satin or polished finish, ASTM B456, 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.

2.6 FABRICATION:

A. Weld and grind smooth joints of fabricated components.

B. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4877 mm (16 feet) without joints. Form corner bend on a 305 mm (12 inch) radius.

C. Provide steel anchor plates, supports, and anchors for securing components to building construction.

D. Form flat surface without distortion.

E. Shop-assemble components and package complete with anchors and fittings.

2.7 CURTAIN

A. Composition: 97-percent flame-resistant polyester fiber and 3-percent proprietary silver antimicrobial fiber.

B. Preconstruction Testing:

1. Flame Propagation: Compliant with NFPA 701.
2. Colorfastness to Light per AATCC Method 16.3: Class 5 (no fading or color change after 60 hours).
3. Antimicrobial Activity under Dynamic Contact Conditions: Sample shall exhibit the following reductions in methicillin-resistant Staphylococcus aureus (versus control broth at T=0) per ASTM E2149 (after 200 commercial launderings):
   a. After 1 Hour: 99.93 percent reduction.
   b. After 4 Hours: 99.99 percent reduction.

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.

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SECTION 10 25 17
CLINICAL PENDANT SYSTEM

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnishing, installation, and connection of clinical pendant system suspended from patient room ceiling near headwall that enables patient services (medical gases, electrical power, or low-voltage services) to be swung either near or away from patient.

1.2 RELATED REQUIREMENTS

A. Requirements for air, oxygen and vacuum outlets in the clinical pendant system: Section 22 62 00, VACUUM SYSTEMS FOR HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR HEALTHCARE FACILITIES.

B. General electrical requirements that are common to more than one section of Division 26: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

C. Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents: Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

D. Cables and wiring: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

E. Raceways and outlet boxes for wiring: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.

F. Wiring devices to be installed in the clinical pendant system: Section 26 27 26, WIRING DEVICES.

G. Lighting fixture requirements when installed in or connected to the clinical pendant system: Section 26 51 00, INTERIOR LIGHTING.

H. Nurse Call and Code One requirements for installation in the clinical pendant system: Section 27 52 23, NURSE /PATIENT COMMUNICATIONS NETWORK.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Compressed Air, Oxygen and Vacuum System Equipment: Furnish, install and test the equipment in accordance with the

Drawings and Section 22 62 00, VACUUM SYSTEMS FOR HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR HEALTHCARE FACILITIES.

2. Electrical receptacles and switches shall 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 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
3. Coordinate the mounting space provisions for the nurse call equipment with Section 27 52 23, NURSE/PATIENT COMMUNICATIONS NETWORK.

B. Preinstallation Meetings: Attendees shall include COR, Contractor, and ceiling, plumbing, electrical subcontractors.

1.4 ACTION SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with the Drawings and this Section.
2. Include electrical ratings, dimensions, mounting details, front view, side view, equipment and device arrangement, wiring diagrams, material, and connection diagrams.
3. Determine final layout of each style of clinical pendant system at this stage. Provide configuration drawings showing all possible device locations (nurse call, medical gases, electrical receptacles and switches, etc.) to the COR. The COR will provide by return of submittal the desired configuration of each style of clinical pendant system. Limit the number and type of devices allowed for each style of unit to the number and type of devices specified for that style below.

1.5 CLOSEOUT SUBMITTALS

A. Two weeks prior to the final inspection, deliver to the COR four copies of complete maintenance and operating manuals including – but not limited to – 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.

B. Certifications: Two weeks prior to the final inspection, deliver four copies of the following certifications to the COR:

1. Certification by the manufacturer that the equipment conforms to the requirements of the Drawings and this Section.
2. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested in accordance with the manufacturer’s recommendations.

1.6 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. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)
99-12.....Health Care Facilities

C. Underwriters Laboratories, Inc. (UL):

UL listed in product category SECTIONS AND UNITS (QQXX). The standard used to investigate listed products in this category is NFPA 70 (NEC).

PART 2 – PRODUCTS

2.1 CLINICAL PENDANT SYSTEM

A. Description: UL-listed ceiling-mounted prefabricated boom with self-supporting basic structural framework, stainless-steel shell, and two articulating service columns/arms (“dual arms”), with one arm in a “standard” configuration and one arm in a “reverse” configuration (“Dual Mount/Tandem”) in order to bypass each other. Arms shall be

capable of rotating up to 340 degrees at each joint by repositioning user-adjustable stops. A box-shaped service console with removable panels shall hang down from the end of each arm.

1. Provide clinical pendant system manufacturer’s base plate and overhead structural supports.
   a. Combined arm and tower assembly shall be capable of supporting accessory loads of up to 400 pounds.
2. Dimensions of Service Consoles: As required to house required plumbing and electrical outlets and to hang required equipment/devices/accessories (coordinate with staff).
3. Service consoles shall be equipped as follows:
   a. An electromagnetic brake handle with a back-up friction brake on each console to prevent drift of each length of the associated articulating arm, both individually and collectively.
   b. Mount each panel directly to the column sections of the unit. Attach device cover plates directly to the face for ease of removal and servicing of devices.
   c. Medical Gasses: Factory-assembled, manifolded and pre-piped, using medical-grade copper pipe, to single-point connections of each service at the top of each service console. Components shall be compatible with those installed elsewhere on the Project site.
      1) Oxygen: As indicated on the Plumbing Drawings.
      2) Nitrous Oxide: As indicated on the Plumbing Drawings.
      3) Nitrogen: As indicated on the Plumbing Drawings.
      4) Medical Air: As indicated on the Plumbing Drawings.
      5) Medical Vacuum: As indicated on the Plumbing Drawings.
      6) Gas Evacuation: As indicated on the Plumbing Drawings.
   d. Provide internal power and signal wiring in separate EMT, flexible metal conduits, or approved raceway. Separate normal power circuits from emergency power circuits. Also, provide adequate supports for conduits and piping within the structural frame.
      1) Electrical outlets on each service console (most on emergency power, some on normal power): Seven emergency power – and one normal power – on each service console.

2) Emergency power outlets shall be hospital-grade NEMA 5-20R duplex receptacles, self-illuminated red with stainless-steel cover plate, engraved “EMERGENCY POWER” with minimum 6 mm (1/4-inch) red-filled letters.
3) Normal power outlets shall be hospital-grade NEMA 5-20R duplex white receptacles with stainless-steel cover plates.
   a) One normal power outlet shall be suitable for the boom motor.

e. Nurse Call: Two-way audio single-bed station with screen display at nurse station.
   1) Provide adequate space for the equipment backboxes.
   2) Provide empty conduit to the sectionalized junction box at the top of the unit.

f. Provide ability to control exam and ambient lighting fixture(s) in ceiling.

g. Provide an adjustable-arm exam light with integral switch. Fixture shall be capable of being mounted on boom via a universal quick-release adaptor..
   1) Highly position-able arm with drift-free positioning.
   2) Module: 16-watt light-emitting diode (LED) bulb.
   3) Illuminance: 39,000 lux (3623 fc) at 61 cm (24 inches).
   4) Color Temperature: 4000 K.
   5) Color Rendering Index (CRI): 92.
   6) Service Life: 40,000-hours.
   7) Input Voltage for Driver: Universal.
   8) Arm Range: Up to 107 cm (42 inches).
   9) Basis-of-Design: 50 LED light or equivalent approved by COR.

4. Arm Colors: White with accent color as selected by the COR from the manufacturer’s full range.
5. Console Colors: One of two wood grains as selected by the COR.
6. Basis-of-Design Product: Spectra Pendant System by Amico.

B. Performance / Design Criteria: Conform to the following requirements.
1. Applicable requirements in NFPA 70 (NEC) and NFPA 99.
2. Assembly and all components shall be UL-listed or -labeled.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify presence and adequacy of structure above suspended ceiling.

B. Do not proceed until structure above ceiling has been confirmed.

3.3 INSTALLATION

A. Install in strict accordance with the following:

1. Applicable requirements in NFPA 70 (aka the NEC).
2. Applicable requirements in NFPA 99.
3. The clinical pendant system manufacturer’s written instructions and recommendations.
4. The Drawings.

B. Install and make connections as required for a complete and operational clinical pendant system for each unit.

– – – END – – –

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 and high-impact wall covering.

1.2 RELATED WORK:

A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

B. Color and texture of 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 protection from single manufacturer.

B. Installer’s Qualifications: Installers are to have a minimum of three (3) years’ experience in the installation of units required for this Project.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Sustainable Design Submittals, as described below:

1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.

C. Shop Drawings: Show design and installation details.

D. Manufacturer's Literature and Data:

1. Handrail/Wall Guard Combinations.
2. Wall Guards.
3. Corner Guards.
4. High Impact Wall covering.

E. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

F. Manufacturer’s qualifications.

G. Installer’s qualifications.

H. Manufacturer’s warranty.

1.5 DELIVERY AND STORAGE:

A. Deliver materials to the Project 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 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):

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

E84-14.....Surface Burning Characteristics of Building Materials

C. Aluminum Association (AA):

DAF 45-09.....Designation System for Aluminum Finishes

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. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

F. SAE International (SAE):

J 1545-05(R2014).....Instrumental Color Difference Measurement for Exterior Finishes.

G. Underwriters Laboratories Inc. (UL):

Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum Extruded: ASTM B221M (B221), Alloy 6063, Temper T5 or T6.

B. Resilient Material:

1. Provide resilient material consisting of high-impact-resistant extruded acrylic vinyl, polyvinyl chloride, or injection-molded thermal plastic 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-resistance rating when tested in accordance with ASTM E84, having a maximum flame spread index of 25 and a smoke developed index 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 other 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.

2.2 CORNER GUARDS (NOT USED)

2.3 WALL GUARDS AND HANDRAILS (NOT USED)

2.4 DOOR AND DOOR FRAME PROTECTION (NOT USED)

2.5 HIGH-IMPACT WALL COVERING:

A. Provide wall covering consisting of high-impact rigid acrylic vinyl or polyvinyl chloride resilient material.

B. Submit fire rating and extinguishing test results for resilient material.

C. Submit statements attesting that the items comply with specified fire and safety code requirements.

D. Rigid Vinyl Acrylic Wall Covering: Wall covering thickness to be 1.02 mm (0.040 inch).

E. Provide adhesive as recommended by the wall covering manufacturer. Provide adhesive with VOC content of 250 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

2.6 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.

2.7 FINISH:

A. Aluminum: In accordance with AA DAF-45.

1. Exposed aluminum: AAMA 611 AA-M12C22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, .01 mm (0.4 mil) thick.
2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

B. Resilient Material: Embossed textures and color in accordance with SAE J1545.

PART 3 - INSTALLATION

3.0 EXAMINATION

A. Examine areas and conditions in which the wall protection materials will be installed.

1. Complete all finishing operations, including painting, before beginning installation of wall protection materials.
2. Clean substrate to remove dust, debris, and loose particles.

B. Wall surface shall be dry and free from dirt, grease, and loose paint.

3.1 RESILIENT CORNER GUARDS:

A. Install corner guards on walls in accordance with manufacturer's instructions.

3.2 STAINLESS STEEL CORNER GUARDS (NOT USED)

3.3 RESILIENT WALL GUARDS, HANDRAILS, AND WALL GUARD HANDRAIL COMBINATION

A. Secure guards to walls with mounting cushions, brackets, and fasteners in accordance with manufacturer's details and instructions.

3.4 ALUMINUM WALL GUARDS (NOT USED)

3.5 STAINLESS STEEL WALL GUARDS (NOT USED)

3.6 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.

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. SUMMARY:

1. Section Includes: Toilet and bath accessories at dressing rooms, toilets, baths, locker rooms, and other areas indicated on Drawings.

1.2 RELATED REQUIREMENTS

A. Color of finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

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-Nickel 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.

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, anchorage, and installation details.
2. Show mounting locations and heights.

C. Manufacturer's Literature and Other Product 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.

F. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer.

G. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Regularly manufactures specified products.

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 facility.
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. 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.

2.2 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide each product from one manufacturer.

2.3 PAPER TOWEL DISPENSERS (NOT USED)

2.4 PAPER TOWEL DISPENSER WITH INTEGRATED TRASH CAN (NOT USED)

2.5 WASTE CONTAINERS

A. Semi-recessed type, without doors. Fed. Spec. WW-P-541, Type II.

B. Fabricate of stainless steel.

C. Form face frame from one piece.

D. Provide removable waste receptacle of approximately 45 L (12 gal.) capacity, fabricated of stainless steel.

E. Waste receptacle key locked in place.

2.6 TOILET PAPER DISPENSERS (NOT USED)

2.7 GRAB BARS

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, 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. 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.
4. Swing-Up Bars: Manually operated; designed to prevent bar from falling when in raised position.

E. Flange for Concealed Mounting:

1. Minimum 2.65 mm (0.1 inch) thick, maximum 79 mm (3-1/8 inch) diameter by 13 mm (1/2 inch) deep, with minimum three set screws for securing flange to back plate.
2. Insert grab bar through center of flange and continuously weld perimeter of grab bar flush to back side of flange.
3. In lieu of providing flange for concealed mounting, and back plate as specified, grab bar may be welded to back plate covered with flange.

F. 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 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.

G. 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.

2.8 SHOWER CURTAIN RODS (NOT USED)

2.9 HOOKS, ROBE

A. Fabricate hook units from chromium-plated brass with satin finish, or stainless steel, 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.

2.10 TOWEL BARS (NOT USED)

2.11 METAL-FRAMED MIRRORS

A. Fed. Spec. A-A-3002 metal frame; chromium-finished steel, anodized aluminum, or 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.

2.11a WOOD-FRAMED MIRRORS

A. Mirror: AISI Type 304 stainless steel with No. 8 mirror-polished finish per Note 4 of ASTM A480/A480M (0-percent blurred).
   1. Thickness: 0.0375 inch (fka 20 gage).

B. Frame: Factory-assembled hardwood profile mitered around perimeter of stainless steel and pre-drilled for multiple concealed fasteners.
   1. Stain: Walnut.

C. Fasteners: Head characterized by recessed six-pointed star (“Torx”) with tamper-resistant pin at center. Conceal with glue-in wood button plug finished to match frame.

D. Back Plate: 3/8-inch-thick medium density fiberboard (MDF).

2.12 MEDICINE CABINETS (NOT USED)

2.13 SOAP DISPENSER (NOT USED)

2.14 SOAP DISHES (NOT USED)

2.15 PAPER CUP DISPENSER (NOT USED)

2.16 MOP RACKS (NOT USED)

2.17 STAINLESS STEEL SHELVES (TYPE 44) (NOT USED)

2.18 STAINLESS STEEL SHELVES (TYPES 45, AND/OR 45C) (NOT USED)

2.19 STAINLESS STEEL SHELVES AT WHEELCHAIR LAVATORY (NOT USED)

2.20 FABRICATION - GENERAL

A. Welding, AWS D10.4.
B. Grind, dress, and finish welded joints to match finish of adjacent surface.
C. Form exposed surfaces from one sheet of stock, free of joints.
D. Provide steel anchors and components required for secure installation.
E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
F. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.
G. Hot-dip galvanized steel – 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.

2.21 FINISH

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: NAAMM AMP 500; No. 4 polished finish.

C. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.

D. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.22 ACCESSORIES

A. Fasteners:

1. Exposed Fasteners: Stainless steel or chromium-plated brass, finish to match adjacent surface.
2. Concealed Fasteners:
   a. Shower, Bath Tubs, 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.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

1. Verify blocking to support accessories is installed and located correctly.

B. Verify location of accessories with Contracting Officer's Representative.

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 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, and free of rack and twist.

D. Toggle bolt to steel anchorage plates in frame partitions.

E. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.

F. Position and install devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance.

G. Align mirrors and other accessories even and level, when installed in battery.

H. Install accessories to prevent striking by other moving items or interference with accessibility.

3.3 CLEANING

A. After installation, clean toilet accessories according to manufacturer’s instructions.

3.4 PROTECTION

A. Protect accessories from damage until Project Completion.

3.5 TOILET ACCESSORY SCHEDULE (SEE DRAWINGS)

- - 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):
D4802-10.....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 semi-gloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field-painting.

PART 3 - EXECUTION

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

B. Install cabinet so that bottom of cabinet is 914 mm (36 inches) above finished floor.

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SECTION 11 05 12
GENERAL MOTOR REQUIREMENTS FOR EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section specifies the furnishing, installation and connection of motors.

1.2 RELATED WORK:

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one Section of Division 26.

B. Other sections specifying motor-driven equipment in Division 11.

1.3 SUBMITTALS:

A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting details, materials, horsepower, RPM, enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.

C. Manuals:

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and application data.

D. Certification: Two weeks prior to final inspection, unless otherwise noted, submit four copies of the following certification to the COR:

1. Certification that the motors have been properly applied, installed, adjusted, lubricated, and tested.

1.4 APPLICABLE PUBLICATIONS:

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. National Electrical Manufacturers Association (NEMA):

MG 1-09(R2010).....Motors and Generators

MG 2-01(R2007).....Safety Standard and Guide for Selection, Installation and Use of Electric Motors and Generators

C. National Fire Protection Association (NFPA):
70-11.....National Electrical Code (NEC)

PART 2 - PRODUCTS

2.1 MOTORS:

A. For alternating current, fractional and integral horsepower motors, NEMA Publications MG 1 and MG 2 shall apply.

B. Voltage ratings shall be as follows:
1. Single phase:
a. Motors connected to 120-volt systems: 115 volts.
b. Motors connected to 208-volt systems: 200 volts.
c. Motors connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
2. Three phase:
a. Motors connected to 208-volt systems: 200 volts.
b. Motors, less than 74.6 kW (100 HP), connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
c. Motors, 74.6 kW (100 HP) or larger, connected to 240-volt systems: 230 volts.
d. Motors, 74.6 kW (100 HP) or larger, connected to 480-volt systems: 460 volts.
e. Motors connected to high voltage systems: Shall conform to NEMA Standards for connection to the nominal system voltage shown on the drawings.

C. Number of phases shall be as follows:
1. Motors, less than 373 W (1/2 HP): Single phase.
2. Motors, 373 W (1/2 HP) and larger: 3 phase.
3. Exceptions:
a. Hermetically sealed motors.
b. Motors for equipment assemblies, less than 746 W (one HP), may be single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.

D. Horsepower ratings shall be adequate for operating the connected loads continuously in the prevailing ambient temperatures in areas where the motors are installed, without exceeding the NEMA standard temperature rises for the motor insulation.

E. Motor designs, as indicated by the NEMA code letters, shall be coordinated with the connected loads to assure adequate starting and running torque.

F. Motor Enclosures:
   1. Shall be the NEMA types shown on the drawings for the motors.
   2. Where the types of motor enclosures are not shown on the drawings, they shall be the NEMA types, which are most suitable for the environmental conditions where the motors are being installed.
   3. Enclosures shall be primed and finish-coated at the factory with manufacturer's prime coat and standard finish.

G. Additional requirements for specific motors, as indicated in other sections of this Project Manual, shall also apply.

H. Energy-Efficient Motors (Motor Efficiencies): All permanently wired polyphase motors of 746 Watts or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 746 Watts or more with open, drip-proof or totally enclosed fan-cooled enclosures shall be NEMA premium efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section of this Project Manual.

Minimum Efficiencies Open Drip-Proof				**Minimum Efficiencies Totally Enclosed Fan-Cooled**			
Rating kW (HP)	**1200 RPM**	**1800 RPM**	**3600 RPM**	**Rating kW (HP)**	**1200 RPM**	**1800 RPM**	**3600 RPM**
0.746 (1)	82.5%	85.5%	77.0%	0.746 (1)	82.5%	85.5%	77.0%
1.12 (1.5)	86.5%	86.5%	84.0%	1.12 (1.5)	87.5%	86.5%	84.0%
1.49 (2)	87.5%	86.5%	85.5%	1.49 (2)	88.5%	86.5%	85.5%
2.24 (3)	88.5%	89.5%	85.5%	2.24 (3)	89.5%	89.5%	86.5%
3.73 (5)	89.5%	89.5%	86.5%	3.73 (5)	89.5%	89.5%	88.5%
5.60 (7.5)	90.2%	91.0%	88.5%	5.60 (7.5)	91.0%	91.7%	89.5%
7.46 (10)	91.7%	91.7%	89.5%	7.46 (10)	91.0%	91.7%	90.2%
11.2 (15)	91.7%	93.0%	90.2%	11.2 (15)	91.7%	92.4%	91.0%
14.9 (20)	92.4%	93.0%	91.0%	14.9 (20)	91.7%	93.0%	91.0%
18.7 (25)	93.0%	93.6%	91.7%	18.7 (25)	93.0%	93.6%	91.7%
22.4 (30)	93.6%	94.1%	91.7%	22.4 (30)	93.0%	93.6%	91.7%
29.8 (40)	94.1%	94.1%	92.4%	29.8 (40)	94.1%	94.1%	92.4%
37.3 (50)	94.1%	94.5%	93.0%	37.3 (50)	94.1%	94.5%	93.0%
44.8 (60)	94.5%	95.0%	93.6%	44.8 (60)	94.5%	95.0%	93.6%
56.9 (75)	94.5%	95.0%	93.6%	56.9 (75)	94.5%	95.4%	93.6%
74.6 (100)	95.0%	95.4%	93.6%	74.6 (100)	95.0%	95.4%	94.1%

93.3 (125)	95.0%	95.4%	94.1%	93.3 (125)	95.0%	95.4%	95.0%
112 (150)	95.4%	95.8%	94.1%	112 (150)	95.8%	95.8%	95.0%
149.2 (200)	95.4%	95.8%	95.0%	149.2 (200)	95.8%	96.2%	95.4%

I. Minimum Power Factor at Full Load and Rated Voltage: 90 percent at 1200 RPM, 1800 RPM and 3600 RPM.

J. Premium efficiency motors shall be used where energy cost/kW x (hours use/year) > 50.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install motors in accordance with manufacturer’s recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of this Project Manual.

3.2 FIELD TESTS

A. Megger all motors after installation, before start-up. All shall test free from grounds.

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SECTION 11 52 13
PROJECTION SCREENS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking in ceilings.

B. Section 09 91 00 - Painting: Field-painting.

C. Division 26 - Electrical: Electrical supply, conduit, and wiring for electric-motor-operated projection screens.

1.03 SUBMITTALS

A. See Section 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, for submittal procedures.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Wiring diagrams for motor operators and actuators, and controls and switches.

C. Maintenance Data: Provide manufacturer's maintenance instructions.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Experienced in installation of the work of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver projection screens to Project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees Fahrenheit. Stack according to manufacturer's recommendations.

C. Acclimate screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

A. Maintain interior of building between 60 and 75 degrees Fahrenheit during and after installation of projection screens.

PART 2 - PRODUCTS

2.01 FRONT PROJECTION SCREENS

A. Front Projection Screens: Factory-assembled unless otherwise indicated.
   1. In Conference Room: Motorized, matte light-diffusing fabric screen, horizontally tensioned without door that closes automatically, recessed in ceiling.
      a. Nominal Screen Dimensions: 70-inches high by 70-inches wide.

B. Matte Light-Diffusing Fabric: Light-diffusing screen fabric; washable, flame-retardant and mildew-resistant.
   1. Material: Matte white vinyl without backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
   2. Seams: No seams permitted in fabric up to 96 inch high by 72 inch wide.

C. Masking Borders: Black, on four sides.

D. Extra Drops: Black; 12 inches.

E. Concealed-in-Ceiling Screen Cases: Steel; integral roller brackets.
   1. Door Slat: Self trim.
   2. Case Finish: Baked enamel.
   3. Case Color: White.
   4. End Caps: Steel; finished to match case.

F. Electrically Operated Screens:
   1. Roller: Steel, 2 inch in diameter, with locking device.
   2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar and plastic end caps.
   3. Horizontal Tensioning: Tab-guided cable system.

G. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.02 ELECTRICAL COMPONENTS

A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Motors: Direct drive, 110 V 60 Hz.
   1. Screen Motor: Mounted inside roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off, internal junction box, electric brake, and pre-set accessible limit switches.
      a. Electrical Characteristics: 1.2 amps.
      b. Motor mounted on sound absorber.

C. Controls: Three (3) position control switch with plate.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate is finished and ready to accept screen installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that openings for recessed screens are correctly sized.

D. Verify type and location of electrical connections.

E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

A. Coordinate screen installation with installation of projection systems.

B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire-suppression, and registers and grilles.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.

B. Do not field-cut screens.

C. Install screens in mountings as specified and as indicated on Drawings.

D. Install plumb and level.

E. Install electrically operated screens ready for connection to power and control systems by others.

F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.

G. Test electrical screens (controls, limit switches, closure, and other operating components) for proper working condition. Adjust as needed.

3.04 PROTECTION

A. Protect installed products until completion of Project.

B. Touch up, repair, or replace damaged products to Architect's satisfaction so that units are in an undamaged condition at Substantial Completion.

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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 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic requirements for non-structural equipment.

C. 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 an independent third party who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 and 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 (Patient Safety Alert AL14-07).

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Certificates of Compliance.

C. Manufacturer's Literature and Data:

1. Lifting Capacity.
2. Lifting Speed.
3. Horizontal Displacement Speeds.
4. Horizontal Axis Motor.
5. Vertical Axis Motor.
6. Emergency Brake.
7. Emergency Lowering Device.
8. Emergency Stopping Device.

9. Electronic Soft-Start and Soft-Stop Motor Control.
10. Current Limiter for Circuit Protection.
11. Low Battery Disconnect System.
12. Strap Length.
13. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations, and behavior problems (for example, vibration and 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.

F. Operation and Maintenance Data:
1. Operating instructions.
2. Signed load test certificate.
3. Details of warranty and servicing requirements.

1.5 APPLICABLE PUBLICATIONS

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

B. International Organization for Standardization (IOS):
10535-06.....Hoist for the Transfer of Disabled Persons-Requirements and Test Methods

C. Underwriters Laboratories (UL):
60601-1(2003).....Medical Electrical Equipment: General Requirements for Safety
94-2013.....UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):
801-2(1991).....Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment-Part 2: Electromagnetic Discharge Requirements

E. Patient Safety Alert AL14-07

PART 2 - PRODUCTS

2.1 CEILING TRACK SYSTEM

A. The Ceiling Track shall be made from high-strength extruded aluminum T66081-T5 at a thickness of 3/16” (4.8mm). The ceiling track shall be finished with baked-enamel paint.

1. Provide the following in each room receiving a patient lift:
   a. Two parallel tracks supporting a traversing track.
      1) One of the parallel tracks shall serve as the “charging track.”
      2) The other shall be referred to as the “gate track.”
   b. A fixed single track including straight and curved pieces and end stops.
   c. One transfer gate bridging between the fixed track and the traveling track. This gate shall have two blocks and a double failsafe action to ensure that the gate will only open when the two tracks are properly aligned and locked together.

2.2 LIFT UNIT

A. The lift unit shall be constructed of a steel frame system (2205lbs / 1000kg tested) driven by a gear-reduced high-torque motor

B. The lift system shall have the following features.

1. Rated Lifting Capacity: 550 lbs (318 kg).
   a. Exception in Rooms Designated for Patients of Size (fka Bariatric Patients): 1000 lbs (455 kg).
2. Electronic soft-start and soft-stop motor control.
3. Emergency lowering device.
4. Emergency stopping device.
5. Current limiter for circuit protection in case of overload.
6. Safety device that stops the motor to lift when batteries are low.
7. Lifting Speed: 2.3in/s (6 cm/s), 1.6in/s (3.5cm) in full capacity.
8. Horizontal Displacement Speed: 5.9in/s (150mm/s).
9. Horizontal Axis Motor: 24VDC at 62 watts and vertical axis motor at 110 watts.
10. Emergency brake (in case of mechanical failure).
11. Strap length up to 90in (2.3m) tested for 2998lbs (1360kg).
12. Cab: VO plastic–fire retardant, UL 94.
13. Wireless remote control.

2.3 MOTORS

A. Vertical Movement-DC Motor:
   1. Type: Class A, fully enclosed, permanent magnet.
   2. Rating: 24Vdc, 1.1A, 110W, 4000RPM, 0.3N-m.
   3. Mounting: Secured to chassis.

B. Horizontal Movement-DC Motor.
   1. Type: Fully enclosed, permanent magnet, integral reducer.
   2. Rating: 24Vdc, 1.8A, 62W, 260RPM, 1.0N-m.
   3. Mounting: Secured to chassis.

2.4 BATTERIES

A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 801-2.

B. Provide rechargeable batteries with up to 120 transfers with a load of 200lbs (74kg) and up to 70 transfers with its maximum load of 440lbs (200kg).

2.5 CHARGER

A. Charger Input: 100-240 VAC, 50/60 Hz.

B. Charger Output: 27 Vdc, 1 A max.

C. Supplemental to the charger, provide a clip-on charging station with indicator lights.

2.6 STRAPS AND SLING

A. The straps shall be made of threaded nylon. The straps shall ensure the patient’s safety by preventing the patient from falling out of the sling.

B. The sling shall be made from a polyester/nylon net material that is pliable, breathable, and easy to use. The sling shall cradle the body of the patient.

PART 3 - EXECUTION

3.0 PREPARATION

A. Confirm the location of the outlet for the charging station in each room and verify that it is on the opposite side of the room from the fixed track.

B. Obtain direction from the COR on area(s) in which the track may be cut.

C. Identify the lowest point in the ceiling of each room and begin installation there. Use a level to determine the requirements for shims elsewhere on the ceiling.

3.1 INSTALLATION

A. Install ceiling-mounted patient lift system per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on Drawings.

B. If the distance in between the suspended ceiling and anchors is more than 18 inches, consult with manufacturer to determine if lateral braces will be required.

C. Suspend parallel and fixed tracks from overhead structure per lift manufacturer’s instructions.

D. Parallel Tracks:

1. Locate so that traversing track will pass within a minimum of 1mm (1/16-inch) and a maximum of 2mm (1/8-inch) of the fixed track.
2. Erect parallel and level.
3. Where installation is in close proximity to a wall, place trolley sets, charger, and required end stops onto the parallels before installing track.

E. Fixed Track:

1. Brackets shall be positioned a maximum of 18 inches apart.
2. Far end of fixed track shall not extend unsupported more than 5 inches beyond last bracket.
3. Ensure that the fixed track is rigid and will be aligned and level with – and square to – the traversing track where the two tracks meet (both with and without load). Adjust fixed track accordingly.

F. Check to see that all edges of track are without debris or excess powder coat in the running surfaces to ensure smooth traversing of the trolley.

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 tests per ISO 10535, in the presence of the COR and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

1. With lift mounted on traversing track, measure deflection by weight testing to 100-percent of the specified rated lifting capacity (service load or safe working load (SWL)). Lift the weight and

measure the amount of track deflection using a laser. At the midspan of the traversing track, deflection shall not exceed 1/200th of the span.

2. To qualify the integrity of the installation, test system to 125-percent of its SWL (factored load) along the whole of its length, including passing through the transfer gate.

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 facilities installation checklist (Patient Safety Alert AL14-07) prior to use for patient movement.

B. Affix load sticker to side of track in discreet but visible location.

C. Validate charger operation.

3.5 CLEANING

A. Leave tracks and lift clean and in full working order.

B. Remove debris and leave Project site in a clean condition.

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SECTION 11 73 03

MEDICAL EQUIPMENT MANAGEMENT RAIL SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Medical equipment management rail system that provides a means to support and secure the following Owner-furnished medical devices and equipment to the wall - and to easily re-position those devices and equipment along the rail - or move them to another rail. Provide adapters and accessory mounting plates for:
   1. Sharps containers.
   2. Dispensers including – but not limited to – the following:
      a. Glove box dispensers.
      b. Sanitizer dispensers.
      c. Soap dispensers.
      d. Paper towel dispensers.
   3.

1.02 SUBMITTALS

A. See Section 01 33 23 - Shop Drawings, Product Data, and Samples for submittal procedures.

B. Product Data: Marked-up to reflect scope and requirements of this Project.

C. Shop Drawings: Include schedule identifying rooms receiving rail systems.
   1. Identify rail lengths and which adapters and accessory mounting plates are required in each room.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Rails: Seamless extruded aluminum profile with a clear anodized finish.
   1. Rail shall have a groove for attaching a friction-fit and lockable adapter that supports the identified Owner-furnished devices and equipment. To prevent accidental dislodgment, design the groove so that a 7-degree tilt is required to attach the adapter.
      a. Edge-to-Edge Face Dimension: 1.145 inches.
      b. Face-to-Back Dimension: 1.175 inches.
      c. Factory-cut to lengths indicated.
         1) Lengths greater than 10 feet shall be joined together using manufacturer’s joiner piece.
      d. Screw Holes in Rail for Mounting to Wall: Pre-drilled on 16-inch centers.
   2. Face profile of rail shall facilitate the insertion of a decorative inlay strip in the field. Inlay strip shall be a high-pressure decorative laminate material designed to resist most hospital cleaning and disinfecting chemicals. Pre-cut inlay strip to match length of rail.
      a. Color of Laminate Inlay Strip: PLAM-1 per Finish Legend.
   3. At each end of rail, provide friction-fit closure caps constructed of white injection-molded thermoplastic material designed to resist most hospital cleaning and disinfecting chemicals and

embedded throughout with a zinc-based anti-microbial compound that cannot be scratched or wiped off.

B. Adapters:
   1. Design and manufacture adapters to be easily snapped on and off any standard Fairfield-style rail by employing a 7-degree upward tilt.
   2. Adapters shall utilize a spring-loaded friction fit to hold the attached product in place when snapped onto the rail and yet allow the product to slide horizontally along the rail until locked in place.
   3. Install Allen-type screws in the bottom of the adapter. Tighten screws to lock the accessories and equipment in place.
   4. Material: Molded medical-grade plastic embedded throughout with a zinc-based anti-microbial compound that cannot be scratched or wiped off.
      a. Exceptions for heavy loads, and at rail manufacturer’s direction, provide multiple adapters, double-width adapters, and/or adapters fabricated from an aluminum extrusion and having a clear-anodized finish.

C. Accessory Mounting Plates:
   1. Material and Finish: Aluminum having a powder-coated finish with anti-microbial silver-ion technology.
   2. Sizes and locations of holes in mounting plates shall match sizes and pattern on the back of the device to be hung.
   3. To maintain plumb orientation of plates taller than six inches, provide 1-1/2-inch long hollow cylindrical polymer standoffs near the bottom edges.

D. Hardware for Mounting to Wall: 1/4-inch-diameter fasteners furnished by manufacturer of rail system and of type suitable for relevant wall framing or substrate - and exceeding loading capability specified in Part-3 article entitled "Examination."

PART 3 - EXECUTION

3.01 EXAMINATION

A. The loading capability of the rail system is dependent on the load-bearing capacity of the wall or partition to which it is mounted.
   1. In the case of metal-stud-and-gypsum-board construction, this includes the adequacy of the installation of both the metal framing and the gypsum board.

B. Installed rail system shall be able to accommodate a functional loading of 62 foot-pounds of torque per foot between 16-inch centers.
   1. Exception: Rails less than 16 inches shall accommodate 20 pounds of direct weight.

C. Notify COR if it appears that relevant existing or new walls or partitions are not capable of accommodating this loading.

3.02 INSTALLATION

A. Install rail system in strict accordance with manufacturer’s installation instructions and approved Shop Drawings.
   1. Comply with licensure rules and local, state, and national codes applicable to this installation.

2. Contact manufacturer with installation questions prior to beginning installation.

B. Position and level the rail on the wall at the correct height and location as shown on approved Shop Drawings. Mark location on wall.

C. For Stud Mounting:
1. Align holes in rail with studs. If required, drill new holes into rail to align with stud locations.
2. Drive 1/4-inch-diameter sheet-metal screws through rail and drywall and securely fasten into studs.

D. For Mounting through Gypsum Board to Metal or Wood Backing:
1. Mark through each of the pre-drilled holes in the rail and onto the drywall.
2. Use 1/4-inch-diameter screws to securely mount the rail to the wall.
   a. For sheet metal backing use sheet-metal screws.
   b. For wood backing, use wood screws.

E. Ensure a tight fit between rail and wall.

F. Remove location marks that remain visible after installation.

G. Insert supplied inlay strip into grooves and secure end caps.

H. Mount Owner-furnished medical devices and equipment to their respective adapters and accessory mounting plates and install in rooms to which they have been assigned on approved Shop Drawings.

3.03 ADJUSTING AND CLEANING

A. Remove packaging – and dust and debris created during mounting.

B. Touch-up wall finishes if necessary to remove evidence of location marks.

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Medical Equipment Management Rail System Schedule							
Room		Track Length in Inches	Sharps Containers	Dispensers			
Number	Name			Glove Boxes	Sanitizer	Soap	Paper Towel
6001	ICU 4	36			1	1	1
6002	ICU 5	30 and 18			1	1	1
6003	ICU 6	30 and 18			1	1	1
6004	ICU 7	36			1	1	1
6005	ICU 8	30 and 18			1	1	1
6006	ICU 9	30 and 18			1	1	1
6007	ICU 10	30 and 18			1	1	1
6008	ICU 11	30 and 18			1	1	1
6009	ICU 12	30 and 18			1	1	1
6010	ICU 13	30 and 18			1	1	1
6011	ICU 14	36			1	1	1
6012	ICU 15	36			1	1	1
6013	ICU 16	36			1	1	1
6014	ADA ICU 3	30 and 18			1	1	1
6015	Nourish	90		1		1	1
6032	ICU 1	36			1	1	1
6033	ADA ICU 2	30 and 18			1	1	1
6054	Meds	144	1	1		1	1
6056	ICU 17	36					

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SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section includes cloth shades. Provide window shades complete, including brackets, fittings, and hardware.

1.2 RELATED WORK:

A. Color of Shade Cloth: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualification: Submit evidence that the manufacture has a minimum of three (3) years’ experience in providing item of type specified, and that the blinds have performed satisfactorily on similar installations. Submit qualifications.

B. Submit qualifications for installers who are trained and approved by manufacturer for installation of units provided.

C. Electrical Requirements: Only for window shade in clerestory.

1. NFPA 70 Article 100.
2. Listed and labeled in accordance with UL 325.
3. Marked for intended use, and tested as a system.
4. Individual testing of components is not acceptable in lieu of system testing.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Shade cloth, each type, 610 mm (24 inch) square, including cord and ring, showing color, finish, and texture.

C. Manufacturer's literature and data; showing details of construction and hardware for:

1. Cloth and window shades.

D. Shop Drawings: Provide fabrication and installation details for cloth shades, including shade cloth materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades (only for window shade in clerestory): Include details of installation and diagrams for power, signal, and control wiring.

E. Fire Testing: Submit report of flame spread and smoke developed during product material tests by independent testing laboratory.

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 window shades for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer's warranty.

1.6 APPLICABLE PUBLICATIONS:

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

B. 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-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

C. National Electric Manufacturer's Association (NEMA):

ICS 6-93(R2006).....Industrial Control and Systems Closures

D. National Fire Protection Association (NFPA):

70-14.....National Electrical Code (NEC)

701-15.....Fire Tests for Flame Propagation of Textiles and Films

E. Underwriters Laboratories Inc. (UL):

325-06(R2013).....Door, Drapery, Gate, Louver, and Window Operators and Systems

PART 2 - PRODUCTS

2.1 CLOTH SHADES:

A. Light-Filtering Shade Cloth: Woven fabric, stain and fade resistant.

1. Type: See Finishes on Drawings.
2. Weave: Mesh.
3. Thickness: 0.0283 inch.

4. Weight: 495 grams per square meter (14.6 ounces per square yard).
5. Orientation on Shadeband: Up the bolt.
6. Openness Factor: 1 percent.
7. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Submit report for testing of shade cloth materials identical to products provided.
8. Drive-End Location: As indicated on Construction Documents.

9. Motorized Operating System (only for window shade in clerestory): Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated on construction documents, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring for motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
   a. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.
   b. Electric Motor: Manufacturer’s standard tubular, enclosed in roller.
      1) Electrical Characteristics: Single phase, 110 V, 60 Hz.
   c. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for control activation of shades:
      1) Wall mounted controls: Switches that are able to electronically set and reconfigure shade open and close limits, shade preset positions, system groups and system subgroups at the control without rewiring and without access to the Electronic Drive Unit.
      2) Provide switches that are adjustable and interlocked with motor controls and set to automatically stop the shade at fully raised and fully lowered positions. Provide manufacturer’s standard- or low-voltage switching.
      3) Operating Function: Stop and hold shade at any position.

2.2 VENETIAN BLINDS (NOT USED)

2.3 VERTICAL BLIND LOUVER BLADES (NOT USED)

2.4 VENETIAN BLINDS AND SHADES ENCLOSED IN WINDOWS FOR MENTAL HEALTH AND BEHAVIORAL CARE UNITS (NOT USED)

2.5 MATERIALS:

A. Stainless Steel: ASTM A240/A240M.

B. Extruded Aluminum: ASTM B221M (B221).

C. Cords for Cloth Roller Shades: #10 stainless-steel chain having not less than 80 kg (175 pounds) breaking strength.

1. Provide clear plastic chain tensioner, compliant with WCMA safety standards.

2.6 FASTENINGS:

A. Zinc-coated or cadmium-plated steel or stainless-steel fastenings of length and type recommended by manufacturer. Except as otherwise specified, provide fastenings for installation with various structural materials as follows:

Type of Fastening	Structural Material
Wood screw	Wood
Tap screw	Metal
Case-hardened, self-tapping screw in pre-drilled hole	Solid masonry, concrete
Screw or bolt in expansion shields	Solid masonry, concrete
Toggle bolts	Hollow blocks, gypsum wallboard, plaster

2.7 FABRICATION:

A. Fabricate cloth shades to fit measurements of finished openings obtained at Project site.

B. Cloth Shades: Rolling type, constructed of shade cloth mounted on rollers. Provide shade cloth with plain sides, and with hem at bottom to accommodate weight bar.

1. Provide separate shades for each individual sash within opening. Provide shade length that exceeds height of window by 305 mm (12 inches) measured from head to sill, in addition to material required to make-up hem:

a. Provide rollers with spindles, nylon bearings, tempered steel springs, and other related accessories required for positive action.
   1) Provide heavy-duty die-cast metal clutch system in steel mounting bracket with auto stop feature for smooth, quiet, and easy lift capabilities.
   2) Provide universal spring-loaded end plug that mounts securely and provides for smooth and easy installation.
   3) Provide easy-lift counterbalance system with integrated spring support for ease of lifting roller shades over large expanses.
   4) Engineer roller shade tubes to span large windows.
   5) Provide integrated leveling device for easy adjustment after installation.
b. Provide rollers of diameter and wall thicknesses required to accommodate operating mechanisms, weights, and widths of shadebands indicated without deflection.
c. Provide rollers with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
d. Secure shade cloth to rollers to prevent wrinkling or folding, and on-line parallel to axis of rollers so that shade hangs plumb.
e. Secure shade cloth with zinc-coated steel or stainless-steel machine screws spaced not over 228 mm (9 inches) on centers.
f. Do not attach shade cloth to rollers with tacks.
g. Provide hem bar of extruded aluminum for entire width of shade band. Heat-seal hem bar on all sides to prevent removal.
h. Provide eyelets with clear openings large enough to accommodate cords, without cutting into cloth when set.
i. Provide cords of sufficient length to permit shades to be drawn to bottom of opening with ends looped and held with cord rings. Attach cords to hems through metal eyelets in center of slats in bottom hems.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Measure openings before fabrication. Do not scale construction documents.

B. Cloth Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions.

1. Locate rollers in level position as high as practicable at heads of windows.
2. Install shades to prevent infiltration of light over rollers.
3. Where extension brackets are necessary for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
4. Place brackets and rollers so that shades do not interfere with window and screen hardware.
5. Electrical Connections: Connect motor-operated shade-cloth roller shades to building electrical system.
6. Shade installation methods not specifically described, are subject to approval of Contracting Officer Representative (COR).

3.2 ADJUSTING:

A. Adjust and shades to operate smoothly, free from binding or malfunction throughout entire operational range.

3.3 CLEANING AND PROTECTION:

A. Clean shade surfaces after installation, according to manufacturer’s written instructions.

B. Provide final protection and maintain conditions that ensure that shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged shades that cannot be repaired, in a manner approved by COR before time of Substantial Completion.

3.4 DEMONSTRATION (NOT USED)

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SECTION 12 36 00
COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies casework countertops with support brackets and integral accessories.

B. Integral accessories include:

1. Sinks.

1.2 RELATED WORK

A. Vertical solid surfacing and window stools: SECTION 06 61 16, SOLID SURFACING FABRICATIONS.

B. Color and patterns of plastic laminate: SECTION 09 06 00, SCHEDULE FOR FINISHES.

B. Stainless-steel sinks (set in not-in-contract countertops of pre-fabricated casework) and wall-hung china sinks (in ICU patient rooms): DIVISION 22, PLUMBING.

1. To avoid creating an infection-control risk, set stainless-steel sinks into countertop from above (“drop-in”). Stainless-steel sinks undermounted to countertops will not be acceptable.

1.3 SUBMITTALS

A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data: Countertop support brackets.

C. Shop Drawings

1. Show dimensions of section and method of assembly.
2. Show details of construction and installation at a scale of ½ inch to a foot.

D. Samples:

1. 150 mm (6 inch) square samples each top.
2. Front edge, back splash, end splash and core with surface material and blocking.

1.4 APPLICABLE PUBLICATIONS

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

B. American Architectural Manufacturers Association (AAMA):

AAMA 2603 Pigmented Organic Coatings on Aluminum Extrusions and Panels

C. ASTM International:

B221-14 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D256-10.....Pendulum Impact Resistance of Plastic

D570-98(R2005).....Water Absorption of Plastics

D638-10.....Tensile Properties of Plastics

D785-08.....Rockwell Hardness of Plastics and Electrical Insulating Materials

D. National Electrical Manufacturers Association (NEMA):

LD 3-05.....High Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 MATERIALS

A. Solid Polymer Material:

1. Filled Methyl Methacrylic Polymer.
2. Performance properties required:

Property	Result	Test
Elongation	0.3% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785
Gloss (60^0 Gordon)	5-20	NEMA LD3.1
Color stability	No change	NEMA LD3 except 200 hour
Abrasion resistance	No loss of pattern Max wear depth 0.0762 mm (0.003 in) - 10000 cycles	NEMA LD3
Water absorption weight (5 max)	24 hours 0.9	ASTM D-570
Izod impact	14 N·m/m (0.25 ft-lb/in)	ASTM D256 (Method A)
Impact resistance	No fracture	NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball
Boiling water surface resistance	No visible change	NEMA LD3
High temperature resistance	Slight surface dulling	NEMA LD3

3. Cast into sheet form and bowl form.
4. Color throughout with subtle veining through thickness.
5. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
6. Bio-based products will be preferred.

2.2 SINKS

A. Sinks of Methyl Methacrylic Polymer:
1. Minimum 19 mm (3/4 inch) thick, cast into rectangular bowl shape with overflow to drain.
2. Provide for underhung installation to countertop.
3. Provide openings for drain offset left of centerline to avoid water from faucet directly hitting drain.
4. Basis-of-Design (for Countertops in Toilet Rooms): Gemstone; Model 1514 VO-ADA Lavatory Bowl. Similar bowls offered by the following manufacturers will be acceptable if equivalent in design and finish as determined by the COR:
   a. Aristech.
   b. DuPont (Corian).
   c. Formica.
   d. Wilsonart.

2.3 TRAPS AND FITTINGS

A. Material as specified in DIVISION 22, PLUMBING.

2.4 WATER FAUCETS (SEE DIVISION 22 (“PLUMBING”))

2.5 FUEL GAS, LABORATORY AIR AND LABORATORY VACUUM FIXTURES (NOT USED)

2.6 FIXTURE IDENTIFICATION (NOT USED)

2.7 ELECTRICAL RECEPTACLES (NOT USED)

2.8 ELECTRIC DROP-IN HOTPLATE (RANGE) UNITS (NOT USED)

2.9 FILM VIEWER (NOT USED)

2.10 COUNTERTOPS

A. Fabricate in largest sections practicable.
B. Fabricate with joints flush on top surface.
C. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets. Fabricate countertops with integral (coved) backsplashes where back edges of countertops are against wall.

D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices.
E. Join edges in a chemical resistant waterproof cement or epoxy cement.
F. Fabricate countertops with applied end splashes where side edges of countertops are against walls or cabinets.
G. Splash Backs and End Splashes:
   1. Not less than 19 mm (3/4 inch) thick.
   2. Height 100 mm (4 inches) unless noted otherwise.
H. Drill or cutout for sinks, and penetrations.
   1. Accurately cut for size of penetration.
   2. Configure cutout for sink per sink manufacturer’s guidelines to ensure ADA-compliance.
I. Methyl Methacrylic Polymer Tops:
   1. Fabricate countertop of methyl methacrylic polymer cast sheet, 19 mm (3/4 inch) thick.
   2. Fabricate back splash and end splash to height shown.
   3. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
   4. Join pieces with adhesive sealant.
   5. Cut out countertop for lavatories, plumbing trim.
   6. Provide concealed fasteners and epoxy cement for anchorage of sinks to countertop.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installing countertops verify that wall surfaces have been finished as specified and that mechanical and electrical service locations are as required.
B. Secure countertops to supporting rails of cabinets with metal fastening devices, or screws through pierced slots in rails.
   1. Where type, size or spacing of fastenings is not shown or specified, submit Shop Drawings showing proposed fastenings and method of installation.
   2. Use round-head bolts or screws.

C. Sinks
   1. Install methyl methacrylic polymer sinks in manufacturer’s recommended adhesive sealer or epoxy compound to underside of methyl methacrylic polymer countertop.
      a. Bolt or screw to countertop to prevent separation of bowl and fracture of adhesive sealant joint.
      b. Install drain and traps to sink.
D. Faucets, Fixtures, and Outlets:
   1. Seal opening between fixture and top.
   2. Secure to top with manufacturers standard fittings.

3.2 PROTECTION AND CLEANING

A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
B. Clean at completion of work.

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SECTION 12 48 13
ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes mats/grids and frames for entrance flooring systems.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:
   1. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of Substantial Completion.
   2. Defer installation of floor mats/grids until time of Substantial Completion of the Project.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 23 ("Shop Drawings, Product Data, and Samples").

B. Product Data: For each type of floor mat/grid and frame specified, including manufacturer's specifications and installation instructions.

C. Shop Drawings: Show layout, in sufficient detail, of specified mat/grid and frame.
   1. Include details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors, and accessories.

D. Samples for Verification: Submit an assembled section of floor mat/grid and frame members with selected tread insert showing each type of color for exposed floor mat/grid, frame, and accessories required.

E. Maintenance Data: For cleaning and maintaining floor mats/grids, in the form of manufacturer's printed instructions.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.05 PROJECT CONDITIONS

A. Field Measurements: Check actual openings for mats/grids by accurate field measurements before fabrication. Record actual measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Single-Source Responsibility: Obtain floor mats/grids and frames from one source and a single manufacturer.

2.02 MAT FRAMES

A. TA – Surface-Mounted Aluminum Frame: 3-1/2-inch-wide aluminum in Alloy 6063-T6 shall permanently position mat for surface-mounted applications.

B. Supply frame in standard mill finish. Mill finish frames in contact with concrete shall be primer-coated.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221, Alloys 6105 and Tempers T5 and T6.

B. Flexible and prime EPDM extrusions.

C. Tread Inserts:
   1. HD – MonoTuft HD™ Carpet shall meet CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Anti-static carpet fibers shall contain antimicrobial additive and be treated with 3M's Scotchgard to reduce soiling.
      a. Color: Refer to Finish Legend.
      b. Fiber Weight: 33 ounces per square yard.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Manufacturer shall offer assistance and guidance to provide a template of irregularly shaped mat/grid assemblies to ensure a proper installation.

3.03 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations.

B. Set mat/grid at height recommended by manufacturer for most effective cleaning action.

C. Coordinate top of mat/grid surfaces with bottom of doors that swing across to provide ample clearance between door and mat/grid.

3.04 CLEANING

A. Furnish a maintenance schedule that includes regular vacuuming and extraction that correctly matches the frequency of cleaning to the amount of traffic that will come across the mat.

3.05 PROTECTION

A. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and the Project is near Substantial Completion.

B. Defer installation of floor mats until time of Substantial Completion of the Project.

– – – END – – –

SECTION 13 05 41
SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

PART 1 – GENERAL

1.1 DESCRIPTION:

A. Provide seismic restraint in accordance with the requirements of this Section in order to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event.

B. The design to resist seismic load shall be based on Seismic Design Categories per section 4.0 of the VA Seismic Design Requirements (H-18-8) dated August 2013, http://www.cfm.va.gov/til/etc/seismic.pdf.

C. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:

1. Architectural Elements: Facades that are not part of the structural system and its shear-resistant elements; architectural projections and parapets that do not function structurally; glazing; nonbearing partitions; suspended ceilings; stairs isolated from the basic structure; cabinets; bookshelves; medical equipment; and storage racks.
2. Electrical Elements: Power and lighting systems; substations; switchgear and switchboards; auxiliary engine-generator sets; transfer switches; motor control centers; motor generators; selector and controller panels; fire protection and alarm systems; special life support systems; and telephone and communication systems.
3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems; boiler equipment and components.

1.2 RELATED WORK

A. Section 11 52 13 ("Projection Screens").

B. Section 11 73 00 ("Ceiling-Mounted Patient Lift System").

C. Section 11 73 02 ("Clinical Pendant System").

1.3 QUALITY CONTROL:

A. Shop-Drawing Preparation:

1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the State of Virginia.
2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State of Virginia.

B. Coordination:
1. Do not install seismic restraints until seismic restraint submittals are approved by the COR.
2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

C. Seismic Certification: In structures assigned to IBC Seismic Design Category C, D, E, or F, permanent equipments and components are to have Special Seismic Certification in accordance with requirements of Section 13.2.2 of ASCE 7 except for equipment that are considered rugged as listed in section 2.2 OSHPD code application notice CAN No. 2-1708A.5, and shall comply with Section 13.2.6 of ASCE 7.

1.4 SUBMITTALS:

A. Submit a coordinated set of equipment anchorage drawings prior to installation including:
1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified.
3. Numerical value of design seismic brace loads.
4. For expansion bolts, include design load and capacity if different from those specified.

B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:
1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.

2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
3. Pipe contents.
4. Structural framing.
5. Location of all gravity load pipe supports and spacing requirements.
6. Numerical value of gravity load reactions.
7. Location of all seismic bracing.
8. Numerical value of applied seismic brace loads.
9. Type of connection (Vertical support, vertical support with seismic brace etc.).
10. Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.

C. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:
1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
3. Maximum spacing of hangers and bracing.
4. Seal of registered structural engineer responsible for design.

D. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.

E. Submit for concrete anchors, the appropriate ICC-ES evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

1.5 APPLICABLE PUBLICATIONS:

A. The Publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):
355.2-07.....Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary

C. American Institute of Steel Construction (AISC):

Load and Resistance Factor Design, Volume 1, Second Edition

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

A36/A36M-08.....Standard Specification for Carbon Structural Steel

A53/A53M-10.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A307-10.....Standard Specification for Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength.

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A325M-09.....Standard Specification for High-Strength Bolts for Structural Steel Joints [Metric]

A490-10.....Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

A490M-10.....Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]

A500/A500M-10.....Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

A501-07.....Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

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

A992/A992M-06.....Standard Specification for Steel for Structural Shapes for Use in Building Framing

A996/A996M-09.....Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement

E488/E488M-96(R2003)....Standard Test Method for Strength of Anchors in Concrete and Masonry Elements

E. American Society of Civil Engineers: Minimum Design Loads for Buildings and Other Structures (ASCE 7) Latest Edition.

F. International Building Code (IBC) Latest Edition
G. VA Seismic Design Requirements, H-18-8, August 2013
H. National Uniform Seismic Installation Guidelines (NUSIG)
I. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum

1.6 REGULATORY REQUIREMENT:

A. IBC Latest Edition.
B. Exceptions: The seismic restraint of the following items may be omitted:
   1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
   2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
   3. Gas and medical piping less than 2 ½ inches inside diameter.
   4. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
   5. All other piping less than 2 ½ inches inside diameter, except for automatic fire suppression systems.
   6. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
   7. All electrical conduits, less than 2 ½ inches inside diameter.
   8. All rectangular air handling ducts less than six square feet in cross sectional area.
   9. All round air handling ducts less than 28 inches in diameter.
   10. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

PART 2 – PRODUCTS

2.1 STEEL:

A. Structural Steel: ASTM A36/A36M and A992/A992M.
B. Structural Tubing: ASTM A500/A500M, Grade B.
C. Structural Tubing: ASTM A501.
D. Steel Pipe: ASTM A53/A53M, Grade B.
E. Bolts & Nuts: ASTM A307, ASTM A325, ASTM A325M, ASTM A490, and ASTM A490M.

2.2 CAST-IN-PLACE CONCRETE:

A. Concrete: 28-day strength, f'c = 25 MPa (3,000 psi)

B. Reinforcing Steel: ASTM A615/615M or ASTM A996/A996M deformed.

PART 3 – EXECUTION

3.1 CONSTRUCTION, GENERAL:

A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.

B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.

C. Construct seismic restraints and anchorage to allow for thermal expansion.

D. Testing Before Final Inspection:

1. Test 10-percent of anchors in masonry and concrete per ASTM E488/E488M, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.

2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3.2 EQUIPMENT RESTRAINT AND BRACING:

A. See drawings for equipment to be restrained or braced.

3.3 MECHANICAL DUCTWORK AND PIPING; ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS; AND TELECOMMUNICATION WIRES AND CABLE TRAYS

A. Support and brace mechanical ductwork and piping; electrical busways, conduits and cable trays; and telecommunication wires and cable trays including boiler plant stacks and breeching to resist directional forces (lateral, longitudinal and vertical).

B. Brace duct and breeching branches with a minimum of 1 brace per branch.

C. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment or building members.

D. Seismic Restraint of Piping:

1. Design criteria:

a. Piping resiliently supported: Restrain to support 120-percent of the weight of the systems and components and contents.
b. Piping not resiliently supported: Restrain to support 60-percent of the weight of the system components and contents.

E. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.

3.4 PARTITIONS

A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.
B. Properly anchor masonry walls to the structure for restraint, so as to carry lateral loads imposed due to earthquake along with their own weight and other lateral forces.

3.5 CEILINGS AND LIGHTING FIXTURES

A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.
B. Independently support and laterally brace all lighting fixtures. Refer to applicable portion of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

3.6 FACADES AND GLAZING

A. Do not install concrete masonry unit filler walls in a manner that can restrain the lateral deflection of the building frame. Provide a gap with adequately sized resilient filler to separate the structural frame from the non-structural filler wall.
B. Tie brick veneers to a separate wall that is independent of the steel frame as shown on construction drawings to ensure strength against applicable seismic forces at the project location.
C. Install attachments to structure for all façade materials as shown on construction drawings to ensure strength against applicable seismic forces at the project location.

3.7 STORAGE RACKS, CABINETS, AND BOOKCASES

A. Install storage racks to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.

B. Anchor medical supply cabinets to the floor or walls and equip them with properly engaged, lockable latches.
C. Anchor filing cabinets that are more than 2 drawers high to the floor or walls, and equip all drawers with properly engaged, lockable latches.
D. Anchor bookcases that are more than 30 inches high to the floor or walls, and equip any doors with properly engaged, lockable latches.

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