

VAMC, FARGO, ND
PERFORM SITE PREP FOR SPS EQUIPMENT
VA PROJECT NUMBER: 437-C SI-241

2101 ELM STREET
FARGO, ND 58102



TECHNICAL SPECIFICATIONS VOLUME I

ANDERSON ENGINEERING OF MN, LLC
Project Number: #17639

Issue for
BID DOCUMENTS
January 22, 2025

A N D E R S O N

Anderson Engineering of Minnesota, LLC
13605 1st Avenue North
Plymouth, MN 55441
Phone: 763-412-4000 Fax: 763-412-4090

Prepared in association with the following:
IMEG ENGINEERING

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

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CERTIFICATIONS PAGE

Architect:

Anderson Engineering
13605 1st Ave. North, Suite #100
Plymouth MN. 55441

Typed or Printed Name: TOM OLESAK
License Number: 2908



Professional Engineer: (Civil)

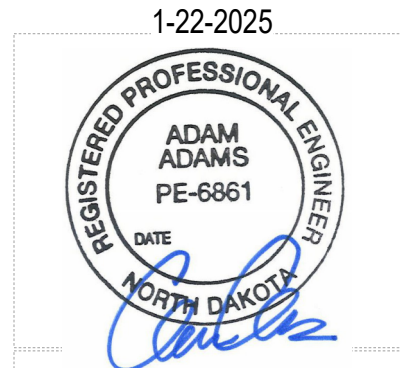
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Typed Name: LEE KOPPY
License Number: PE-8207



Professional Engineer: (Structural)

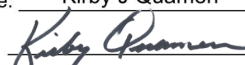
Anderson Engineering
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Typed or Printed Name: ADAM ADAMS
License Number: PE-6861



Professional Engineer: (Mechanical)

Anderson Engineering
13605 1st Ave. North, Suite #100
Plymouth MN. 55441
Typed or Printed Name: KIRBY J. QUAMEN
License Number: MINNESOTA - 52555

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota

Print Name: Kirby J Quamen
Signature: 
Date 01/22/2025 License # 52555

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Professional Engineer: (Electrical)

Anderson Engineering

13605 1st Ave. North, Suite #100

Plymouth MN. 55441

Typed or Printed Name: ANDREW T.

WEBER

License Number: MINNESOTA - 62718

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota

Print Name: Andrew T. Weber

Signature: Andrew T. Weber

Date 01/22/2025 License # 62718

Professional Engineer: (Fire Alarm
& Technology)

IMEG Cooperation

2882 106th Street

Des Moines, IA 50322

Typed or Printed Name: KRISTEN L.

SPINA

License Number: IOWA - 21081



Professional Engineer: (Fire
Protection)

IMEG Cooperation

2882 106th Street

Des Moines, IA 50322

Typed or Printed Name: DELLAN J.

LLEWELLYN

License Number: IOWA - 27052



- - - END - - -

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**DEPARTMENT OF VETERANS AFFAIRS
 VHA MASTER SPECIFICATIONS**

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SECTION 00 01 15
LIST OF DRAWING SHEETS

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

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GI001	SHEET INDEX
GI002	ABBREVIATIONS
GI101	LOWER LEVEL LIFE SAFETY PLAN - AREA A
GI102	LOWER LEVEL LIFE SAFETY PLAN - AREA B
GC100	ICRA & PCRA NOTES AND CATEGORIES
GC101	LOWER LEVEL PHASING PLAN - OVERALL
GC102-A	LOWER LEVEL INFECTION CONTROL PLAN - AREA A
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V-101	EXISTING SURVEY
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CS101	SITE PLAN
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S001	STRUCTURAL NOTE SHEET
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S102	SLAB CUTTING PLAN
S201	SECOND FLOOR FRAMING PLAN
S202	ROOF FRAMING PLAN
S301	FOOTING & FOUNDATION DETAILS
S401	FRAMING DETAILS
S402	FRAMING DETAILS

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ARCHITECTURAL

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AD101-R	LOWER LEVEL DEMOLITION PLAN -AREA B RESTORATION
AS100	LOWER LEVEL FLOOR PLAN-OVERALL
AS101-A	LOWER LEVEL FLOOR PLAN - AREA A
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AC101-A	LOWER LEVEL REFLECTED CEILING PLAN - AREA A
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AS501	EXTERIOR PLAN DETAILS
AS520	EXTERIOR SECTION DETAILS
AS530	ROOF DETAILS
AS540	INTERIOR PLAN DETAILS
AS550	INTERIOR SECTION DETAILS
AS601	WALL & PARTITION TYPES AND DETAILS
AS602	DOOR SCHEDULE AND ELEVATIONS
AS640	MOUNTING HEIGHTS

INTERIOR

AF101	LOWER LEVEL FINISH PLAN
AF102	LOWER LEVEL FINISH PLAN - TEMP TRAILER
AF600	MATERIAL AND ROOM FINISH SCHEDULE
AW111	LOWER LEVEL WAYFINDING PLAN - AREA A
AW112	LOWER LEVEL WAYFINDING PLAN - TEMP TRAILER - AREA B
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EQUIPMENT

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FSD 101 LOWER LEVEL DEMOLITION PLAN - FIRE PROTECTION
FS 001 SPS TRAILER FLOOR PLAN - FIRE PROTECTION
FS 101 LOWER LEVEL FLOOR PLAN - FIRE PROTECTION
FS 500 FIRE PROTECTION DETAILS
FA000 ELECTRICAL SYSTEMS COVER SHEET
FA101 SPS TRAILER FLOOR PLAN - FIRE ALARM
FA102 LOWER LEVEL FLOOR PLAN - FIRE ALARM

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MD-102 MECHANICAL LOWER LEVEL - STEAM, VENT, AIR DEMO PLAN
MH-101 MECHANICAL LOWER LEVEL - HVAC PLAN
MH-102 MECHANICAL LOWER LEVEL - HVAC PRESSURE PLAN
MH-103 MECHANICAL LOWER LEVEL - HVAC - SURROUNDING TAB
MP-101 MECHANICAL PLAN - LOWER LEVEL STEAM PIPING
M-301 MECHANICAL PIPING - STEAM FLOW DIAGRAM
M-501 MECHANICAL DETAILS
M-601 MECHANICAL SCHEDULES

PLUMBING

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PD-101 PLUMBING UNDERGROUND - SANITARY DEMOLITION PLAN
PD-102 PLUMBING LOWER LEVEL - RO AND DOMESTIC WATER DEMO PLANS
PD-103 PLUMBING LOWER LEVEL - VENT AND AIR DEMO PLAN
PL-101 PLUMBING LOWER LEVEL - UNDERGROUND SANITARY PLAN
PL-102 PLUMBING LOWER LEVEL - DOMESTIC WATER PLANS
PL-103 PLUMBING LOWER LEVEL - VENT AND AIR PLAN
PP-101 PLUMBING PLANS - PROCESS PIPING - LOWER LEVEL RO - SPS

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PP-103	PLUMBING PLAN - PROCESS PIPING - LOWER LEVEL RO TEMPORARY TRAILER
P-301	PLUMBING RO FLOW DIAGRAM
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ELECTRICAL

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ESR-101	ELECTRICAL SITE RESTORATION PLAN
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ED-102	LOWER LEVEL - POWER DEMOLITION PLAN
EL-101	LOWER LEVEL - LIGHTING PLAN
EP-101	LOWER LEVEL - POWER PLAN
EQ-101	LOWER LEVEL - EQUIPMENT POWER PLAN
E-501	ONE-LINE DIAGRAM & ELECTRICAL DETAILS
E-601	ELECTRICAL SCHEDULES
E-602	ELECTRICAL SCHEDULES

TECHNOLOGY

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TD101	LOWER LEVEL DEMOLITION PLAN - TECHNOLOGY
T001	SITE PLAN - TECHNOLOGY
T101	LOWER LEVEL FLOOR PLAN - TECHNOLOGY
T200	TECHNOLOGY ENLARGEMENT PLANS
T500	TECHNOLOGY SCHEDULES

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SECTION 01 00 00
GENERAL REQUIREMENTS

GENERAL

1.1 SAFETY REQUIREMENTS

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

1.2 GENERAL INTENTION

- A. Contractor must completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for PREFORM SITE PREP FOR SPS EQUIPMENT as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Medical Center Engineering Officer.
- C. Offices of Anderson Engineering of MN, 13605 1st Avenue North, Plymouth MN 55441, as Architect-Engineers, will render certain technical services during construction. Such services must be considered as advisory to the Government and must not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. All employees of general contractor and subcontractors must 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 ADDITIONAL REQUIREMENTS.

- A. Contracts: The following staff or resource people will be working with you at the Fargo VA HealthCare System. Please feel free to contact these individuals with any questions:
 - 1. Chief Engineer: Shawn Bergan (701) 239-3700, ext. 3388

2. Project Engineer (COR): Rooney Villegas (701) 232-3241,
ext. 3518

B. Vehicle Traffic Rules: All construction contractors must park their vehicles in areas assigned by the Contracting Officer or Engineering Service representatives. All persons coming on the premises of the Fargo VA Health Care System must obey the posted traffic and parking rules. Police Service will issue tickets to contractor vehicles parked in areas other than those assigned.

C. Keys/ID Badges: VA ID badges must be worn while you are on Medical Center premises. Contact Engineering Service to obtain an ID badge and any necessary keys. Contract staff is responsible for the security of keys and ID badges issued to them and may be charged for replacement cost. You must notify Engineering (ext. 3361) personnel in Building BD-50 immediately to report any loss, theft or suspected reproduction of a Medical Center key or access card.

D. Smoking: Smoking is prohibited on all VA property.

E. Use of Government Telephones and Fax Machines

1. Government telephones are for official Government business use. Contract staff may use telephones, for local calls only, to contact your place of employment or to address unforeseen events such as injury on the job, work schedule changes etc.

2. Contact Project Engineer to use fax machine for local faxes.

F. Housekeeping

1. All construction sites must be kept clean, orderly and in sanitary condition.

2. All rags/cloth and rubbish soaked with flammable and/or combustible material must be placed in a covered metal receptacle until being disposed.
3. A clear and unobstructed path must be maintained to all portable fire extinguishers, hose cabinets, pull stations, fire exits and electrical panels.
4. Fire doors and smoke barrier doors must not be blocked in a manner to prevent their protective operation in the event of a fire.
5. The use of wedges, stops, ropes, or other unapproved methods of holding doors open is prohibited.
6. All indoor trash containers over 20 gallons will be constructed of non-combustible materials and be covered or have a self-extinguishing cover.

G. Storage

1. Any commodities that may be hazardous in combination with each other must be stored so they cannot come in contact with each other.
2. Store flammable and combustible liquids and gasses in approved storage containers.
3. A clear space of 18 inches will be maintained below sprinkler heads.
4. Items stored in tiers will be stacked, blocked, interlocked and limited in height to prevent sliding or collapse.
5. Materials will not be stored directly on the floor.
6. Storage areas will be kept free from accumulation of materials that constitute hazards.
7. Stairwells, stairways and corridors must not be utilized for storage.

8. Storage will not be permitted within 3 feet of an electric panel in all directions.

H. Hazardous Materials

1. Discovery of any suspected asbestos containing material must result in the contractor stopping work in the area and reporting the discovery immediately to the Engineering Office (ext. 3361) in Building 1 or one of the contact persons indicated above. Engineering Service must then evaluate the suspect material and if it contains asbestos must arrange for the removal of the asbestos.

1.4 STATEMENT OF BID ITEM(S)

A. ITEM I, GENERAL CONSTRUCTION:

1. Installation of RO Water system and Mechanical room for RO water equipment.
2. Site preparation for delivery of a Mobile Sterile Processing trailer provided by the VA's Vendor. Site preparation includes, but not limited to. Demolition of exterior site elements such as, portions of; retaining walls, sidewalks, concrete ramps, and chain link fence. Preparation of site for concrete pad for trailer and other MEP work. Construction of a wood framed weatherproof enclosure from the Mobile Sterile Processing trailer to the facility. Extension of Mechanical, plumbing, piping, electrical, fire protection, and technology systems to the Mobile Trailer.
3. Includes but not limited to; Demolishing and renovation of the SPS Decontamination/ Receiving and Prep/ Pack Assembly area, Mechanical space adjacent to the Prep/ Pack Assembly area. In preparation for and working with

VA vendor for installation of sterile processing equipment, including Mechanical, Electrical, Plumbing, Piping, and Technology infrastructure.

4. Removal or connecting enclosure, disconnection of MEPT & fire protection services, and construction of site and building elements, when Mobile Sterile Processing Trailer is removed.

1.5 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.

1.6 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

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

B. Security Procedures:

1. General Contractor's employees must not enter the project site without appropriate badge. ID badges must be worn at all times while on the Medical Center premises. 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 must give one week's notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.

3. No photography of VA premises is allowed without written permission of the Contracting Officer. Patients and staff are not to be photographed at any time.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

c. Key Control:

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

d. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors must 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 must 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 must 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 must 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 must 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 must be performed and tracked through the EDMS system.
 - b) "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

E. Motor Vehicle Restrictions

1. Vehicle authorization request must be required for any vehicle entering the site and such request must be submitted 24 hours before the date and time of access. Access must be restricted to picking up and dropping off materials and supplies.
2. All General Contractor and its employees must park in designated areas only. Contractor to coordinate with VA Contracting Officer or Engineering Services representative.

1.7 OPERATIONS AND STORAGE AREAS (FAR 52.236-10)

- A. The Contractor must confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor must hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and must be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities must remain the property of the Contractor and must 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 must, 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 must 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 must protect them from damage. The Contractor must repair or pay for the repair of any damaged curbs, sidewalks, or roads.

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

Contractor's materials and equipment will be permitted subject to fire and safety requirements.

H. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they must be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR . All such actions must be coordinated with the COR or Utility Company involved:

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

I. Phasing:

1. 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 must include, but not be limited to:
2. To ensure such executions, Contractor must furnish the COR with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each

specific area of site, building or portion thereof. In addition, Contractor must 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 ensure accomplishment of this work in successive phases mutually agreeable to

Medical Center Director, COR and Contractor, as follows:

Phase I: Construction of Mechanical room on the Lower Level, for RO water system and build out of RO water system, hot water system and blending tank for Mobile Sterile Processing Trailer. Extending RO lines to Lab on the first level and through the lower-level hallways, Mechanical room near loading dock and through finished office space above the ACT ceiling.

Phase II: Multi Part; Portions of this phase may be started and/or completed prior to Phase 1.

1. Phase 2A Site Preparation. Removal of concrete sidewalk at roadway. Removal and salvage of retaining wall block, chain link fencing. Removal of portion of concrete walk way and stoop. Removal of a portion of concrete ramp. Site grading for installation of concrete pad(s) and gravel. Adjustment of manhole rim and cover height. Core drill into below grade Sanitary Manhole to provide connection for mobile Sterile Processing Department trailer.
2. Phase 2B: Delivery and set up of Mobile SPD trailer by VA vendor. Provide Structural tie down points per VA Vendor direction and as shown on drawings.
3. Phase 2C: Construct Temporary enclosure for connecting the Mobile SPD trailer to the facility and extend fire protection piping and alarm systems, plumbing and IT

systems through the trailer enclosure and connect to the Mobile SPD trailer. Provide and connect a temporary Air Handling Unit to the temporary enclosure. Connection of sanitary piping to site utilities. Removal of existing window and provide chase wall on the interior of the existing facility at the Engineering department.

Phase III: Demolition of the Sterile Processing department on the Lower Level, including disconnection of equipment for removal by VA Vendor. Construction of new Sterile Processing department for placement of new equipment by VA Vendor. Final connection of equipment.

Phase IV: Disconnection of facility services and sanitary piping from the Mobile SPD trailer. Removal of the temporary connection between the SPD trailer and facility. Removal of the SPD trailer from the site. Removal of the some electrical elements from the site and a portion of the concrete pad. Reinstalling site elements removed and salvaged in previous phase. Reinstalling window and removal of interior chase in the Engineering department. Removal of temp door hardware. Painting and patching of all areas disturbed by demolition. Revisions to the RO water system. Install stoop, sidewalk and portion of concrete ramp removed in previous phase.

J. Building will be occupied during performance of work; but Exterior site work and SPS Processing area on the Lower Level will be vacated.

1. Contractor must 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 must permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress must be isolated from the construction area by temporary partitions and have walking surfaces, lighting etc. to facilitate patient and staff access. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
- K. Construction Fence: Before construction operations begin, Contractor must 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 must extend to 25mm (one inch) above grade. Remove the fence when directed by COR.
- L. When a building and/or construction site is turned over to Contractor, Contractor must accept entire responsibility including upkeep and maintenance therefore:
1. Contractor must maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
 2. Contractor must maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor must 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.

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

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR or, Chief Engineer or. Chief of Facilities Management. Electrical work must be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment must 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 must submit a request to interrupt any such services to COR, in writing, 21 calendar days in advance

- of proposed interruption. Request must state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 4. Major interruptions of any system must be requested, in writing, at least 21 calendar days prior to the desired time and must be performed as directed by the COR.
 5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee must be the responsibility of the Government and not the Contractor.
- N. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, must be removed back to their source. Those which are indicated to be abandoned but are not required to be entirely removed, must be sealed, capped or plugged at the main, branch or panel they originate from. The lines must not be capped in finished areas, but must 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.

- o. 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. Wherever excavation for new utility lines cross
existing roads, at least one lane must be open to traffic
at all times with approval.
 2. Method and scheduling of required cutting, altering and
removal of existing roads, walks and entrances must be
approved by the COR.
- p. Coordinate the work for this contract with other
construction operations as directed by COR. This includes
the scheduling of traffic and the use of roadways, as
specified in Article, USE OF ROADWAYS.

1.8 ALTERATIONS

- A. Survey: Before any work is started, the Contractor must
make a thorough survey with the COR and a representative of
VA Supply Service, of areas of buildings in which
alterations occur and areas which are anticipated routes of
access, and furnish a report, signed by all three, to the
Contracting Officer. This report must list by rooms and
spaces:
 1. Existing condition and types of resilient flooring,
doors, windows, walls and other surfaces not required to
be altered throughout affected areas of buildings.
 2. Existence and conditions of items such as plumbing
fixtures and accessories, electrical fixtures, equipment,

- venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
3. Must note any discrepancies between drawings and existing conditions at site.
 4. Must designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR and/or Supply Representative, to be in such condition that their use is impossible or impractical, must 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).
- c. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together must make a thorough re-survey of the areas of buildings involved. They must 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 must also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore

damage caused by Contractor's workers in executing work of this contract.

D. Protection: Provide the following protective measures:

1. Wherever existing roof surfaces are disturbed they must be protected against water infiltration. In case of leaks, they must 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 must be adequately protected prior to starting work, and this protection must be maintained intact until all work in the area is completed.

1.9 DISPOSAL AND RETENTION

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

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government must be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
2. Items not reserved must become property of the Contractor and be removed by Contractor from Medical Center.

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

1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (FAR 52.236-9)

- A. The Contractor must 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 must only remove trees when specifically authorized to do so, and must 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 workers, the Contractor must 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 must 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 must 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.

1.11 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR. Existing work to be altered or extended and that is found to be defective in any way, must be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, must 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, must 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 must immediately restore to service and repair any damage caused by Contractor's workers to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.
- 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 "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.12 PHYSICAL DATA - SOIL CONDITIONS

- A. Data and information furnished or referred to below is for the Contractor's information. The Government must not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.
- B. A copy of a soil report is attached to these specifications as an appendix, and must be considered part of the contract documents.
- c. 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.

1.13 PROFESSIONAL SURVEYING SERVICES

- A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor must perform services specified herein and in other specification sections. The Contractor must 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.

1.14 LAYOUT OF WORK

- A. The Contractor must lay out the work from Government established base lines and bench marks, indicated on the drawings, and must be responsible for all measurements in connection with the layout. The Contractor must 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 must be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor must 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.

(FAR 52.236-17)

- 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 each such structure and/or addition, roads, parking lots, 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 must 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 must 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, Contractor must 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, Contractor must 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 building and/or 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.
 4. Lines and elevations of roads, streets and parking lots.
- 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 COR.
- F. The Contractor must perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.15 AS-BUILT DRAWINGS

- A. The contractor must 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 must be shown in the same general detail as used in the contract drawings. To ensure compliance, as-built drawings must be made available for the COR review, as often as requested.
- C. Contractor must deliver two approved completed sets of as-built drawings in the electronic version (scanned PDF) to the COR or, Chief Engineer, or Chief of Facilities

Management within 21 calendar days after each completed phase and after the acceptance of the project by the COR.

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

1.16 WARRANTY MANAGEMENT

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

1. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the company of the Contractor, subcontractors, manufacturers or suppliers involved.
2. Furnish with each warranty the name, address and telephone number of each of the guarantor's representatives nearest project location.
3. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers and for all commissioned systems such as fire protection and alarm systems, sprinkler systems and lightning protection systems, etc.
4. A list for each warranted equipment item, feature of construction or system indicating:
 - a. Name of item.
 - b. Model and serial numbers.
 - c. Location where installed.
 - d. Name and phone numbers of manufacturers and suppliers.
 - e. Name and phone numbers of manufacturers or suppliers.
 - f. Names, addresses and phone numbers of sources of spare parts.
 - g. Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
 - h. Starting point and duration of warranty period.

- i. Summary of maintenance procedures required to continue the warranty in force.
 - j. Cross-reference to specific pertinent Operation and Maintenance manuals.
 - k. Organizations, names and phone numbers of persons to call for warranty service.
 - l. Typical response time and repair time expected for various warranted equipment.
5. The plans for attendance at the 4 and 9-month post construction warranty inspections conducted by the government.
6. Procedure and status of tagging of all equipment covered by extended warranties.
7. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- B. Performance & Payment Bonds: The Performance & Payment Bonds must remain effective throughout the construction period.
 1. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
 2. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the contractor's expenses, the Contracting

- Officer will have the right to recoup expenses from the bonding company.
3. Following oral or written notification of required construction warranty repair work, the Contractor must respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.
- c. Pre-Warranty Conference: Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor must meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/ reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contract will be located within the local service area of the warranted construction, be continuously available and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in conjunction with other portions of this provision.

D. Contractor's Response to Construction Warranty Service Requirements. Must be as follows:

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

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

a) Code 1-Life Safety Systems

- 1) Fire suppression systems.
- 2) Fire alarm system(s).

b) Code 1-Air Conditioning Systems

- 1) Air conditioning leak in part of the building, if causing damage.
- 2) Air conditioning system not cooling properly.

c) Code 1 Doors

- 1) Overhead doors not operational, causing a security, fire or safety problem.
- 1) Interior, exterior personnel doors or hardware, not functioning properly, causing security, fire or safety problem.

d) Code 3-Doors

- 1) Overhead doors not operational.
- 2) Interior/exterior personnel doors or hardware not functioning properly.

e) Code 1-Electrical

- 1) Power failure (entire area or any building operational after 1600 hours).
- 2) Security lights.
- 3) Smoke detectors.

f) Code 2-Electrical

- 1) Power failure (no power to a room or part of building). Receptacle and lights not operational (in a room or part of building).

g) Code 3-Electrical

- 1) Exterior lights not operational.

h) Code 1-Heat

- 1) Power failure affecting heat.

i) Code 1-Plumbing

- 1) Hot water heater failure.
- 2) Leaking water supply pipes

j) Code 2-Plumbing

- 1) Flush valves not operating properly
- 2) Fixture drain, supply line or any water pipe leaking.
- 3) Toilet leaking at base.

k) Code 3- Plumbing

- 1) Leaky faucets.

l) Code 3-Interior

- 1) Floors damaged.
- 2) Paint chipping or peeling.
- 3) Casework damaged.

m) Code 1-Roof Leaks

- 1) Damage to property is occurring.

n) Code 2-Water (Hot)

- 1) No hot water in portion of building listed.

o) Code 3

- 1) All work not listed above.

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

Warranty Tags
Type of product/material
Model number

Warranty Tags
Serial number
Contract number
Warranty period from/to
Inspector's signature
Construction Contractor
Address
Telephone number
Warranty Contact
Address
Telephone number
Warranty response time priority code

1.17 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads must be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.
- B. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.18 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will

be permitted subject to written approval and compliance with the following provisions:

1. Permission to use each unit or system must be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.
2. Electrical installations used by the equipment must 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 must be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices must be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. Voltage supplied to each item of equipment must be verified to be correct and it must be determined that motors are not overloaded. The electrical equipment must be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
3. Units must be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
4. Automatic temperature control systems for preheat coils must function properly and all safety controls must function to prevent coil freeze-up damage.
5. The air filtering system utilized must be that which is designed for the system when complete, and all filter

elements must 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 must 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. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.

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

1.19 TEMPORARY USE OF EXISTING ELEVATORS

- A. Use of existing elevator for handling building materials and Contractor's personnel will be permitted subject to following provisions:
 - 1. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Elevator for use by contractor will be determined by COR after award of contract. Elevator must

- only be used between the hour specified by COR and for special nonrecurring time intervals when permission is granted. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.
2. Contractor covers and provides maximum protection of following elevator components:
 - a) Entrance jambs, heads soffits and threshold plates.
 - b) Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
 - c) Finish flooring.
 3. Government will inspect hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they must be removed and replaced by new hoisting ropes at the contractors expense.

1.20 TEMPORARY TOILETS

- A. Provide where directed, (for use of all Contractor's workers) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COR, provide suitable dry closets where directed. Keep such places clean and free from flies and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.
1. Contractor may have for use of Contractor's workers, such toilet accommodations as may be assigned to Contractor by Medical Center. Contractor must keep such places clean and be responsible for any damage done thereto by Contractor's workers. Failure to maintain satisfactory

condition in toilets will deprive Contractor of the privilege to use such toilets.

1.21 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government must 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 must be the prevailing rates charged to the Government. The Contractor must carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner, in compliance with code and as satisfactory to the Contracting Officer, must install and maintain all necessary temporary connections and distribution lines.
- C. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
 - 1. Obtain heat by connecting to Medical Center heating distribution system.
- D. Electricity (for Construction and Testing): Furnish all temporary electric services.
 - 1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor must meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat.

Electricity for all other uses is available at no cost to the Contractor.

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

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

1.22 TESTS

- A. As per specification section 23 05 93 the contractor must 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 must 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 must furnish all

labor, materials, equipment, instruments, and forms, to conduct and record such tests.

- D. Mechanical and electrical systems must be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.
- E. All related components as defined above must be functioning when any system component is tested. Tests must 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.

1.23 INSTRUCTIONS

- A. Contractor must 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 must be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals must be complete, detailed guides for the maintenance and operation of equipment. They must 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 must include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations must include "exploded" views showing and identifying each separate item. Emphasis must be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control must be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution must 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 must 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, must be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system must 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 must be at such times as scheduled by the COR and must be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor must submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.24 GOVERNMENT-FURNISHED PROPERTY

- A. The Government must deliver to the Contractor, the Government-furnished property shown on the drawings.
- B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at the Medical Center.
- C. Contractor must be prepared to receive this equipment from Government and store or place such equipment not less than 90 days before Completion Date of project.

- 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 must arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor must 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 must 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.

1.25 RELOCATED EQUIPMENT ITEMS

- A. Contractor must disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment indicated or otherwise shown to be relocated by the Contractor.
- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the COR.
- C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, at the main whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".
- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

1.26 CONSTRUCTION SIGN

- A. Provide a Construction Sign where directed by the COR. All wood members must be of framing lumber. Cover sign frame with 0.7 mm (24 gage) galvanized sheet steel nailed securely around edges and on all bearings. Provide three 100 by 100 mm (4 inch by 4 inch) posts (or equivalent round posts) set 1200 mm (four feet) into ground. Set bottom of sign level at 900 mm (three feet) above ground and secure to posts with through bolts. Make posts full height of

sign. Brace posts with 50 x 100 mm (two by four inch) material as directed.

- B. Paint all surfaces of sign and posts two coats of white gloss paint. Border and letters must be of black gloss paint, except project title which must be blue gloss paint.
- C. Maintain sign and remove it when directed by the COR.
- D. Detail Drawing of construction sign showing required legend and other characteristics of sign is shown on the drawings.

1.27 SAFETY SIGN

- A. Provide a Safety Sign where directed by COR. Face of sign must be 19 mm (3/4 inch) thick exterior grade plywood. Provide two 100 mm by 100 mm (four by four inch) posts extending full height of sign and 900 mm (three feet) into ground. Set bottom of sign level at 1200 mm (four feet) above ground.
- B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design must be painted with gloss paint of colors noted.
- C. Maintain sign and remove it when directed by COR.
- D. Drawing details in VA Signage Design Manual, Section 11 Specialty Signs (found on VA TIL) show required legend and other characteristics of sign and are shown on the drawings.
- E. Post the number of accident free days on a daily basis.

- - - E N D - - -

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

PART 1- GENERAL

1.1 DESCRIPTION:

- A. The Contractor must develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and must keep the Project Schedule up-to-date in accordance with the requirements of this section and must 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 must be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor must designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).
- B. The Contractor's representative must 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 must 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 must submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal must 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 must 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 must resubmit another consultant within 10 calendar days for renewed consideration. The Contractor must have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

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

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor must submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal must also include three copies of a

computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule must 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 must 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 must 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 must 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 must reflect the Contractor's approach to scheduling the complete project.

The final Project Schedule in its original form must contain no contract changes or delays which may have been incurred during the final network diagram development period and must reflect the entire contract duration as defined in the bid documents. These changes/delays must 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 must revise and must submit three blue line

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

- C. The approved baseline schedule and the computer-produced schedule(s) generated there from must 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 must cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) must equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor must 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 must 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 852.232 - Article 71 Including NAS-CPM for (PAYMENTS UNDER FIXED PRICE CONSTRUCTION).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor must 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 must cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work must 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 Must:
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 COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
 4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled

"start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.

5. The schedule must be generally numbered in such a way to reflect either discipline, phase or location of the work.

B. The Contractor must 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 must 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 must not be deemed to have been approved by the COTR. Failure to include any element of work required for the performance of this contract must not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.

D. Compact Disk Requirements and CPM Activity/Event Record Specifications:

Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor must submit an application and certificate for payment using VA Form 10-6001a 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 852.232 -Article 71 Including NAS-CPM for (PAYMENTS UNDER FIXED PRICE CONSTRUCTION). The Contractor must be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests must 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 must be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) must attend all monthly schedule update meetings. The Contractor must accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
1. Actual start and/or finish dates for updated/completed activities/events.
 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 5. Completion percentage for all completed and partially completed activities/events.
 6. Logic and duration revisions required by this section of the specifications.
 7. Activity/event duration and percent complete must be updated independently.
- B. After completion of the joint review, the contractor must 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 must rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis must 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 must use the schedule logic and/or durations provided and approved by the COR. After each rerun update, the resulting electronic project schedule data file must 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 must 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, RE office representatives, and all subcontractors needed, as determined by the SRE, must meet to discuss the monthly updated schedule. The main emphasis must 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 must 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 must notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions must 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 must 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, must 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 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 must be supported with a justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor must 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). The Contractor

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must 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 must be analyzed on a month by month basis.

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

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.
- B. Detailed submittal requirements are found in the technical sections of the contract specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.
- C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

1.2 DEFINITIONS

- A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.
- B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.
- C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.
- D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or

product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.

- E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.
- F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.
- H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.
- I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.
- J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data must 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 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 a blank submittal register in electronic format. Thereafter, the Contractor must fill in the blank register with the required submittals as documented in the project spec. The Contractor must 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 must 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 must submit formal monthly updates to the submittal register in electronic format. Each monthly update must 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 must 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 without 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:

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North

VA Project 437-C SI-241
1-22-2025
Bid Documents
Fargo, ND 58102

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

1.6 SUBMITTAL FORMAT AND TRANSMISSION

- A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.
- B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.
- C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.
- D. E-mail electronic submittal documents smaller than 5MB in size to e-mail addresses as directed by the Contracting Officer.

- E. Provide electronic documents over 5MB through an electronic FTP file sharing system. Confirm that the electronic FTP file sharing system can be accessed from the VA computer network. The Contractor is responsible for setting up, providing, and maintaining the electronic FTP file sharing system for the construction contract period of performance.
- F. Provide hard copies of submittals when requested by the Contracting Officer. Up to 3 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the VA.

1.7 SAMPLES

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

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

1.10 VA REVIEW OF SUBMITTALS AND RFIS

- A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project will assist the VA in reviewing all submittals and determining contractual compliance. Review will be only for conformance with the applicable codes, standards and contract requirements.
- B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.
- C. Period of review for each resubmittal is the same as for initial submittal.
- D. VA review period is 15 business days for submittals.
- E. VA review period is 10 business 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. Work must not proceed for this item until resubmittal is approved.
 - 4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

1.11 APPROVED SUBMITTALS

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

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Perform Site Prep for SPS Equipment
2101 Elm Street North

VA Project 437-C SI-241
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Bid Documents
Fargo, ND 58102

- 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 must 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.

P. 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).

Q. 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 though provided by physician or registered personnel.

1.3 SUBMITTAL REQUIREMENTS:

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 VHA COR Regional Safety Engineer or Contracting Officer Representative or Government Designated Authority.

1.5 ACCIDENT PREVENTION PLAN (APP):

- A. The APP (aka Construction Safety & Health Plan) must 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 must 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 must 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 must 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 must 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 must include identify person(s) responsible to provide the following to the Contracting Officer Representative:

1. Monthly HS&E Performance Report (Exposure Hours Data);
2. Mishap investigation reports;
3. Project site injury and illness logs;
4. 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 must address all applicable occupational, patient, and public safety risks in site-specific compliance and accident prevention plans. These Plans must 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 must be made with the knowledge and concurrence of the Contracting Officer Representative or Government Designated Authority. 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 VHA COR Office and 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 must prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)
- B. AHAs must 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 must not begin until the AHA for the work activity has been accepted by the Contracting Officer Representative or Government Designated Authority and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
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) must be identified and included in the AHA. Certification of their competency/qualification must be

submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.

2. The AHA must 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 must 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 must be updated (an administrative action not requiring an updated AHA). The new person must 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 must 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 must 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 must 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 must 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 must 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 must be provided and must fulfill the same roles and responsibilities as the primary SSHO. The Alternate Safety Officer must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated subparagraphs. 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 must 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 must 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 must 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 must 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 must 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) must 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 must 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 Facility Safety Officer or 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 must undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing must 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 must 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 must conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs must conduct frequent and regular safety inspections (daily) of their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO must 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 Facility Safety Officer or Contracting Officer Representative.
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) must randomly conduct a monthly site safety inspection. The CSP or CSHT must 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 Facility Safety Officer or 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 Facility Safety Officer or Contracting Officer Representative within one week of the onsite inspection.

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

- A. The prime contractor must 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 Facility Safety Officer or 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 must be reported within 24 hours or as soon as practical. Within the notification the sender must 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 Facility Safety Officer or 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 must 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 Facility Safety Officer or Contracting Officer Representative within 7 calendar days of the accident. The Facility Safety Officer or 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 Facility Safety Officer or 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 Facility Safety Officer or Contracting Officer Representative monthly. The contractor and associated sub-contractors'

OSHA 300 logs will be made available to the Facility Safety Officer or 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, must 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 must 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 Facility Safety Officer or 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 Facility Safety Officer or 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 must be worn by each person on site unless written authorization is given by Facility Safety Officer or 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, must 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 Occupational 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 fire-rated solid core wood in steel frame, painted
3. Dust proof one-hour fire-rated drywall
4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer's instructions.
5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
7. Disinfectant: EPA-registered, Hospital-approved disinfectant or equivalent product
8. Portable Ceiling Access Module

1.15 DUST CONTROL

- A. Contractor must 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 must be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

1.16 TUBERCULOSIS SCREENING

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

1.17 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 Facility Safety Officer or 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 1 hour rated and smoke-tight separations between 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, $\frac{3}{4}$ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one-hour fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.

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 Facility Safety Officer or Contracting Officer Representative.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Facility Safety Officer or 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.
- 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 Facility Safety Officer or Contracting Officer Representative. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas must be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed must be recorded by the medical center and copies provided to the VHA COR.

- N. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Facility Safety Officer or Contracting Officer Representative.
- O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Contracting Officer Representative or Facility Safety Office. Obtain permits from Contracting Officer Representative at least 72 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 Facility Safety Officer and Contracting Officer Representative.
- Q. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- R. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- S. If required, submit documentation to the Facility Safety Office and COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.18 ELECTRICAL

- A. All electrical work must 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 must be licensed journeyman or master electricians. All apprentice electricians performing under this contract must 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 and Facility Safety Officer and Contracting Officer Representative 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 must 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 Chief Engineer and Facility Safety Officer or 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 alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work must not begin until the AHA for the work activity and permit for energized

work has been reviewed and accepted by the Facility Safety Officer or Contracting Officer Representative 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 must 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 must 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 must 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 must 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 must 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 must be followed in selecting appropriate work platforms.
 1. Scaffolds, platforms, or temporary floors must 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 must not be used as working platforms.
- D. Contractors must use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags must be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags must be readily visible, made of materials that will withstand the environment in which they are used, be legible and must 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 must be used.

1.21 EXCAVATION AND TRENCHES

- A. All excavation and trenching work must 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 must require a written trenching and excavation permit (NOTE - some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit must 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 must be provided to the Facility Safety Officer and/or Contracting Officer Representative 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 must be closed out and provided to the Facility Safety Officer and/or Contracting Officer Representative. The permit must be maintained onsite, and the first section of the permit must 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 determine 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.

C. The second section of the permit for excavations greater than five feet in depth must 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, must 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 must 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 must be submitted to the VHA COR and/or other Government Designated Authority 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document by the Facility Safety Officer and/or Contracting Officer Representative.
- D. Crane operators must 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 must 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 must 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 must 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 must 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) must be developed and submitted to the Facility Safety Officer and/or Contracting Officer Representative.

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 and/or Contracting Officer Representative. Obtain permits from Contracting Officer Representative at least 24 hours in advance.

1.26 LADDERS

- A. All Ladder use must comply with 29 CFR 1926 Subpart X and EM 385-1-1.
- B. All portable ladders must be of sufficient length and must be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels must be in place on ladders
- D. Step Ladders must not be used in the closed position
- E. Top steps or cap of step ladders must not be used as a step
- F. Portable ladders, used as temporary access, must 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) must be provided to assist workers in mounting and dismounting the ladder.
 - 2. In no case must 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 must be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders must 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 must 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 must 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 must be protected by a removable guardrail system or must be attended when the guarding system has been removed, or other fall protection system.
1. Covers must be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
 2. Covers must 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, must be immediately cut out. No hole or opening must be left unattended unless covered.
 4. Non-load-bearing skylights must 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:

DEPARTMENT 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 https://www.aabc.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org

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AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AH	American Hort https://www.americanhort.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org
AIA	American Institute of Architects http://www.aia.org
AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction https://aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ARPM	Association for Rubber Product Manufacturers https://arpm.com
ASABE	American Society of Agricultural and Biological Engineers https://www.asabe.org
ASCE	American Society of Civil Engineers http://www.asce.org

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

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CLFMI	Chain Link Fence Manufacturers Institute https://www.chainlinkinfo.org
CPA	Composite Panel Association https://www.compositepanel.org
CPMB	Concrete Plant Manufacturers Bureau https://www.cpmc.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute https://www.crsi.org
CTI	Cooling Technology Institute https://www.cti.org
DHA	Decorative Hardwoods Association https://www.decorativehardwoods.org
DHI	Door and Hardware Institute https://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute https://www.eei.org
EPA	United States Environmental Protection Agency https://www.epa.gov
ETL	ETL Testing Services http://www.intertek.com
FAA	Federal Aviation Administration https://www.faa.gov
FCC	Federal Communications Commission https://www.fcc.gov

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FPS	Forest Products Society http://www.forestprod.org
GAN A	Glass Association of North America http://www.glasswebsite.com
FM	Factory Mutual Global Insurance https://www.fmglobal.com
GA	Gypsum Association https://gypsum.org
GSA	General Services Administration https://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
ICC	International Code Council https://shop.iccsafe.org
ICEA	Insulated Cable Engineers Association https://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers https://www.ieee.org/
IGMA	Insulating Glass Manufacturers Alliance https://www.igmaonline.org
IMSA	International Municipal Signal Association http://www.imsasafety.org
MBMA	Metal Building Manufacturers Association https://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry http://msshq.org

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NAAMM	National Association of Architectural Metal Manufacturers https://www.naamm.org
PHCC	Plumbing-Heating-Cooling Contractors Association https://www.phccweb.org
NBS	National Bureau of Standards See - NIST
NBBI	The National Board of Boiler and Pressure Vessel Inspectors https://www.nationalboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association https://www.nema.org
NFPA	National Fire Protection Association https://www.nfpa.org
NHLA	National Hardwood Lumber Association https://www.nhla.com
NIH	National Institute of Health https://www.nih.gov
NIST	National Institute of Standards and Technology https://www.nist.gov
NELMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association (See CPA, Composite Panel Association)
NSF	National Sanitation Foundation http://www.nsf.org
OSHA	Occupational Safety and Health Administration Department of Labor https://www.osha.gov

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PCA	Portland Cement Association https://www.cement.org
PCI	Precast Prestressed Concrete Institute https://www.pci.org
PPI	Plastics Pipe Institute https://www.plasticpipe.org
PEI	Porcelain Enamel Institute http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org
RFCI	Resilient Floor Covering Institute https://www.rfci.com
RIS	Redwood Inspection Service (See Western Wood Products Association) https://www.wwpa.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
SJI	Steel Joist Institute https://www.steeljoist.org
SMACNA	Sheet Metal & Air-Conditioning Contractors' National Association https://www.smacna.org
SSPC	The Society for Protective Coatings https://www.sspc.org
STI	Steel Tank Institute https://www.steeltank.com
SWI	Steel Window Institute https://www.steelwindows.com

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TCNA Tile Council of North America

<https://www.tcnatile.com>

TEMA Tubular Exchanger Manufacturers Association

<http://www.tema.org>

TPI Truss Plate Institute

<https://www.tpinst.org>

UBC The Uniform Building Code
(See ICC)

UL Underwriters' Laboratories Incorporated

<https://www.ul.com>

ULC Underwriters' Laboratories of Canada

<https://www.ulc.ca>

WCLB West Coast Lumber Inspection Bureau

<http://www.wclib.org>

WDMA Window and Door Manufacturers Association

<https://www.wdma.com>

WRCLA Western Red Cedar Lumber Association

<https://www.realcedar.com>

WWPA Western Wood Products Association

<http://www.wwpa.org>

- - - E N D - - -

SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. ASTM International (ASTM)
 - 1. D3740 - (2012a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - 2. E329 - (2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.3 SUBMITTALS

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

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

PART 2 PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system. that complies with the FAR Clause 52.246.12 titled "Inspection of Construction". QC consists of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all design and construction operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Office or Authorized designee for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CQC PLAN:

- A. Submit the CQC Plan no later than 15 days after receipt of Notice to Proceed (NTP) proposed to implement the requirements of the FAR Clause 52.246.12 titled "Inspection of Construction". The Government will consider an Interim CQC Plan for the first 15 days of operation, which must be accepted within 10 business days of NTP. Design and/or construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an Interim plan applicable to the particular feature of work to be started. Work outside of the accepted Interim CQC Plan will not be permitted to begin until acceptance of a CQC Plan or another Interim CQC Plan containing the additional work scope is accepted.
- B. Content of the CQC Plan: Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record consultants,

architects/engineers (A/E), fabricators, suppliers, and purchasing agents:

1. A description of the QC organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.
2. The name, qualifications (in resume format) duties, responsibilities, and authorities of each person assigned a CQC function.
3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer or Authorized designee.
4. Procedures for scheduling, reviewing, certifying, and managing submittals including those of subcontractors, designers of record, consultants, A/E's offsite fabricators, suppliers and purchasing agents. These procedures must be in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.
5. Control, verification, and acceptance of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer or Authorized designee are required to be used)
6. Procedures for tracking Preparatory, Initial, and Follow-Up control phases and control, verification, and acceptance tests including documentation.
7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

8. Reporting procedures, including proposed reporting formats.
 9. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of specifications can generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Coordination meeting.
 10. Coordinate schedule work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections and Schedule of Special Inspections. Where the applicable Code issue by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the CQC Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the CQC Plan.
- C. Additional Requirements for Design Quality Control (DQC) Plan: The following additional requirements apply to the DQC Plan for DB projects only and not DBB projects:
1. Submit and maintain a DQC Plan as an effective QC program which assures that all services required by this contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, all documents must be technically reviewed by competent, independent reviewers identified in the DQC Plan. The same element that produced the product may not perform the independent technical review (ITR). Correct errors and deficiencies in the design documents prior to submitting them to the Government.
 2. Include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific Contract period. This should be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item. This should be a forward planning as well as a project monitoring tool. The schedule

reflects calendar days and not dates for each activity. If the schedule is changed, submit a revised schedule reflecting the change within 7 calendar days. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit at each design phase as part of the project documentation these completed discipline-specific checklists.

3. Implement the DQC Plan by a DQC Manager who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated. This individual must be a person who has verifiable engineering or architectural design experience and is a Professional Engineer or Registered Architect within the state of Construction location. Notify the Contracting Officer or Authorized designee, in writing, of the name of the individual, and the name of an alternate person assigned to the position.
- D. Acceptance of Plan: Acceptance of the Contractor's plan is required prior to the start of 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 the CQC Plan and operations including removal of personnel as necessary, to obtain the quality specified.
- E. Notification of Changes: After acceptance of the CQC Plan, notify the Contracting Officer or Authorized designee in writing of any proposed change. Proposed changes are subject to acceptance by the Government prior to implementation by the Contractor.

3.3 COORDINATION MEETING:

After the Preconstruction Conference Post-award Conference before start of design or construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized designee to discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 5 business days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CC operations, design activities (if applicable), control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the

Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and Contracting Officer or Authorized designee and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION:

- A. Personnel Requirements: The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, a Design Quality Manager (if applicable), and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager must satisfy the requirements of Specification 01 35 26 Safety Requirements and reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer or Authorized designee. Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawings submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Government.
- B. CQC System Manager: Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC system Manager is required to be a PM or SRE to determine qualifications based on project complexity at construction

review. This CQC System manager is on the site at all times during construction and is employed by the General Contractor. Identify in the plan an alternate to serve in the event of the CDQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

- C. CQC Personnel: In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist in the CQC System Manager for the following areas, as applicable: electrical, mechanical, civil, structural, environmental, architectural, materials technician submittals clerk, Commissioning Agent/LEED specialist, and low voltage systems. These individuals or specified technical companies are directly employed by the General Contractor and cannot be employed by a supplier or subcontractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the Experience Matrix listed herein. These individuals have no other duties other than quality control. A single person can cover more than one area provided that the single person is qualified to perform QC activities in each designated and that workload allows.

EXPERIENCE MATRIX

Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 2 years experience in the type of work being performed on this project or technician with 5 years related experience.
Mechanical	Graduate Mechanical Engineer with 2 years experience or construction professional with 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 construction professional with 5 years of experience supervising electrical features of work in the field with a construction company.

Area	Qualifications
Structural	Graduate Civil Engineer (with Structural Track or Focus), Structural Engineer, or Construction Manager with 2 years experience or construction professional with 5 years experience supervising structural features of work in the field with a construction company.
Architectural	Graduate Architect with 2 years experience or construction professional with 5 years of related experience.
Environmental	Graduate Environmental Engineer with 3 years experience.
Submittals	Submittal Clerk with 1 year experience.
Concrete, Pavement, and Soils	Materials Technician with 2 years experience for the appropriate area.
Testing, Adjusting, and Balancing (TAB)	Specialist must be a member of AABC or an experienced technician of the firm certified by the NEBB.
Design Quality Control Manager	Registered Architect or Professional Engineer

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

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

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

have to be coordinated with the Section 01 33 23 Shop Drawings, Product Data, and Samples to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL:

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

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

- i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards - contract defined or industry standard if not contract defined - for that feature of work.
 - j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
 - k. Discussion of the initial control phase.
 - l. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the Preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the Preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.
- B. Initial Phase: This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:
1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the Preparatory meeting.
 2. Verify adequacy of controls to ensure full contract compliance. Verify the required control inspection and testing is in compliance with the contract.
 3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
 4. Resolve all differences.
 5. Check safety to include compliance with an upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 6. The Government needs to be notified at least 48 hours or 2 business days in advance of beginning the initial phase for definable features of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the

exact location of initial phase for definable feature of work for future reference and comparison with Follow-Up phases.

7. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
 8. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections.
- C. Follow-Up Phase: Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements until the completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final Follow-Up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections, and the Schedule of Special Inspections
- D. Additional Preparatory and Initial Phases on the same definable features of work if: the quality ongoing work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

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

3. Check test instrument calibration data against certified standards.
 4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 5. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the unique sequential control number identifying the test. If approved by the Contracting Officer or Authorized designee, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer or Authorized designee. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.
- B. Testing Laboratories: All testing laboratories must be validated through the procedures contained in Specification section 01 45 29 Testing Laboratory Services.
1. Capability Check: The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.
 2. Capability Recheck: If the selected laboratory fails the capability check, the Contractor will be assessed a charge equal to value of recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.
- C. Onsite Laboratory: The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

- A. **Punch-Out Inspection:** Conduct an inspection of the work by the CQC system Manager near the end of the work, or any increment of the work established by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final Inspection.
- B. **Pre-Final Inspection:** The Government will perform the Pre-Final Inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final Acceptance Inspection with the customer can be scheduled. Correct any items noted on the Pre-Final Inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate construction completion dates.
- C. **Final Acceptance Inspection:** The Contractor's QC Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Authorized designee is required to be in attendance at the Final Acceptance Inspection. Additional Government personnel can also be in attendance. The Final Acceptance Inspection will be formally scheduled by the Contracting Officer's or Authorized designee based upon results of the Pre-Final Inspection. Notify the Contracting Officer through the Resident Engineer office at least 14 days prior to the Final Acceptance Inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date schedule for the Final Acceptance Inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the

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

3.9 DOCUMENTATION

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

incorporated in the work and workmanship comply with the Contract.
Furnish the original and one copy of these records in report form to the Government daily with 1 week after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit on report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate QC personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Templates of various quality control reports can be found on the Whole Building Design Guide website at https://www.wbdg.org/FFC/NAVGRAPH/01%2045%2000.00%2020_quality_control_reports.pdf

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

--- End of Section ---

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. American Association of State Highway and Transportation Officials (AASHTO):
- T27-11 Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
- T96-02 (R2006) Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- T99-10 Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
- T104-99 (R2007) Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
- T180-10 Standard Method of Test for Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
- T191-02 (R2006) Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method
- T310-13 Standard Method of Test for In-place Density and Moisture Content of Soil and Soil-aggregate by Nuclear Methods (Shallow Depth)
- C. American Concrete Institute (ACI):
- 506.4R-94 (R2004) Guide for the Evaluation of Shotcrete

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-C SI-241
1-22-2025
Bid Documents

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

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

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

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

C33/C33M-11a Standard Specification for Concrete Aggregates

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

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

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

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

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

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

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

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

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

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

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

C1019-11 Standard Test Method for Sampling and Testing
Grout

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

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

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

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

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

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

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

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

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

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

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

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

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

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

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

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

D3740-11 Standard Practice for Minimum Requirements for
Agencies Engaged in Testing and/or Inspection

	of Soil and Rock as used in Engineering Design and Construction
D6938-10	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
E94-04 (2010)	Standard Guide for Radiographic Examination
E164-08	Standard Practice for Contact Ultrasonic Testing of Weldments
E329-11c	Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
E543-09	Standard Specification for Agencies Performing Non-Destructive Testing
E605-93 (R2011)	Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members
E709-08	Standard Guide for Magnetic Particle Examination
E1155-96 (R2008)	Determining FF Floor Flatness and FL Floor Levelness Numbers
F3125/F3125M-15	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
E. American Welding Society (AWS):	
D1.D1.1M-10	Structural Welding Code-Steel

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing must 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 must inspect materials and workmanship and perform tests described herein and additional tests requested by VHA COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory must direct attention of VHA COR to such failure.
- C. Written Reports: Testing laboratory must submit test reports to VHA COR, Contractor, unless other arrangements are agreed to in writing by the VHA COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to VHA COR immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory must 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 must be as identified herein and must 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 VHA 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 VHA COR extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 - 2. Provide part time observation of fill placement and compaction and field density testing in building areas and provide part 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.
2. Make field density tests in accordance with the primary testing method following ASTM D2922 wherever possible. Field density tests utilizing ASTM D1556 or ASTM D2167 to 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 must provide satisfactory explanation to the RE/COR before the tests are conducted.
 - a. Building Slab Subgrade: At least one test of subgrade for every 185 m² (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 m² (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 m² (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 VHA 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 material (min). One test per source (min). Additional testing per COR/RE may be necessary, and will be at no cost to the government.
- 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 VHA COR.

3.2 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.
 - 3. One test per material (min). One test per supplier (min).
- B. Submit laboratory test report of topsoil to RE/COR.

3.6 SITE WORK CONCRETE:

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

3.8 CONCRETE:

- A. Batch Plant Inspection and Materials Testing:
 - 1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of VHA COR with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by VHA COR.
 - 2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to VHA 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 an ACI Certified Field Technician, Grade 1, technician for the entire placement at all times to perform concrete sampling and testing.
2. Review the delivery and batch 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 m³ (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 VHA COR make three cylinders for each 80 m³ (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. VHA 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 m³

- (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m³ (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 VHA 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 VHA COR. Compile laboratory test reports as follows: Compressive strength test must be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it must be discarded and strength of spare cylinder must be used.
 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
 3. Furnish certified compression test reports (duplicate) to VHA 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/m³ (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.
- B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- C. Written report must include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.10 ADDITIONAL TESTING

- A. RE/COR may request additional testing at any time at no additional cost to the Government.

- - - E N D - - -

**SECTION 01 45 35
SPECIAL INSPECTIONS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This guide specification will be applicable to both new buildings and existing building rehabilitations/renovations. In addition to the Special Inspection and testing specified requirements, a registered design professional must perform structural observations during construction. All observed deficiencies will be immediately reported to the Contracting Officer. The registered design professional performing these observations will be a representative of the Designer of Record (DOR) for the building being constructed.

1.2 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society of Civil Engineers (ASCE)
1. ASCE 7 - (2016) Minimum Design Loads for Buildings and Other Structures
- C. International Code Council (ICC)
2. ICC IBC - (2021) International Building Code

1.3 GENERAL REQUIREMENTS

- A. Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections and Chapter 17 of ICC IBC. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections are to be performed by an independent third party and are intended to ensure that the work of the prime contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

1.4 DEFINITIONS

- A. Continuous Special Inspections - The constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks.
- B. Periodic Special Inspections - Special Inspections by the special inspector who is intermittently present where the work to be inspected has been or is being performed. Specific time interval on a specific Special Inspection should be indicated on the Schedule of Special Inspections.
- C. Perform - Perform these Special Inspections tasks for each welded joint or member.
- D. Observe - Observe these Special Inspections items on a random daily basis. Operations need not be delayed pending these inspections.
- E. Special Inspector (SI) - A qualified person retained by the contractor and approved by the Contracting Officer as having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Prime Contractor.
- F. Associate Special Inspector (ASI) - A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.
- G. Third Party - A third party inspector must not be company employee of the Contractor or any Sub-Contractor performing the work to be inspected.
- H. Special Inspector of Record (SIOR) - SIOR must be an independent third party hired directly by the Prime Contractor and is required for the following project conditions:
 - 1. Seismic Design Category D, E, or F; and assigned to Risk Category III, IV, or V.
 - 2. Seismic Design Category D, E, or F; and with a height greater than 22860mm 75 ft.
 - 3. Seismic Design Category E, assigned to Risk Category I or II and the building is greater than two (2) stories above grade plane.
 - 4. Nominal design wind speed in excess of 49 m/sec 100 mph; and assigned to Risk Category III, IV, or V.

5. Nominal design wind speed in excess of 49 mm/sec 100mph; and with a height greater than 23m 75ft.
6. In addition to these conditions, the DOR is encouraged to consider using an SIOR on large magnitude or critical projects where this additional level of quality control is affordable.
- I. Contracting Officer - The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).
- J. Contractor's Quality Control (QC) Manager - An individual retained by the prime contractor and qualified in accordance with the Section 01 45 00.00 10 QUALITY CONTROL having the overall responsibility for the contractor's QC organization.
- K. Designer of Record (DOR) - A registered design professional is contracted by the Government as an A/E responsible for the overall design and review of submittal documents prepared by others. The DOR is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in state in which the design professional works. The DOR is also referred to as the Engineer of Record (EOR) in design code documents.
- L. Statement of Special Inspections (SSI) - A document developed by the DOR identifying the material, systems, components and work required to have Special Inspections and covering the following:
- M. Submittals: Government approval is required for all submittals. CQC Special Inspection reports shall be submitted under this Specification section and follow the [Special Inspection]: [Applicable Specification section or description] naming convention. Submit the following:
 1. SD-01 Preconstruction Submittals;
 2. SIOR Letter of Acceptance;
 3. Special Inspections Project Manual;
 4. Special Inspections Agency's Written Practices
 5. NDT Procedures and Equipment' Calibration Records;
 6. SD-06 Test Reports;
 7. Special Inspections
 8. Daily Reports;
 9. Special Inspections; Biweekly Reports;
 10. SD-07 Certificates;

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11. AC472 Accreditation;
 12. Special Inspector of Record Qualifications;
 13. Special Inspector Qualifications;
 14. Qualification Records for NDT technicians;
 15. SD-11 Closeout Submittals;
 16. Interim Final Report of Special Inspections;
 17. Comprehensive Final Report of Special Inspections;
- N. Special Inspector Qualifications: Submit qualifications for each SI, ASI, and the SIOR from the following certifying associations:
 Associated Air Balance Council (AABC); American Concrete Institute (ACI); Association of the Wall and Ceiling Industry (AWCI); American Welding Society (AWS); Factory Mutual (FM); International Code Council (ICC); Nondestructive Testing (NDT); National Institute for Certification in Engineering Technologies (NICET); Precast/Prestressed Concrete Institute (PCI); Post-Tensioning Institute (PTI); Underwriters Laboratories (UL). Qualifications should be in accordance with the following minimums.

QUALIFICATIONS

Area	Special Inspector	Associated Special Inspector	SIOR
Concrete Construction	ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or ACI Concrete Construction Special Inspector, or NICET Concrete Technician Level III Certificate in Construction Materials Testing, or, Registered Professional Engineer with related experience	ACI Concrete Construction Special Inspector in Training, or Engineer-In-Training with one year of related experience	

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Area	Special Inspector	Associated Special Inspector	SIOR
Verification of Site Soil Condition, Fill Placement, and Load-Bearing Requirements	ICC Soils Special Inspector Certificate with one year of related experience, or NICET Soils Technician Level II Certificate in Construction Material Testing, or NICET Geotechnical Engineering Technician Level II Construction or Generalist Certificate, or Geologist-In-Training with one year of related experience, or Registered Professional Engineer with related experience	NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or NICET Geotechnical Engineering Technician Level I Construction, or Generalist Certificate with one year of related experience, or Engineer-In-Training with one year of related experience	
Exterior Insulation and Finish Systems (EIFS)	AWCI EIFS Inspector Certificate, or Exterior Design Institute Certificate, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience	
Fire-Resistant Penetrations and Joints	Passed the UL Firestop Exam with one year of related experience, or Passed the FM Firestop Exam with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience.	

Area	Special Inspector	Associated Special Inspector	SIOR
Smoke Control	AABC Technician Certification with one year of related experience, or Registered Professional Engineer with related experience	Engineer-In-Training with one year of related experience.	
SIOR			Registered Professional Engineer

PART 2 - PRODUCTS

2.1 FABRICATORS SPECIAL INSPECTION

- A. Special Inspections of fabricator's work performed in the fabricator's shop is required to be inspected in accordance with the Statement of Special Inspections and the Schedule of Special Inspections unless the fabricator is certified by the approved agency to perform such work without Special Inspections. Submit the applicable certification(s) from the following list to the Contracting Officer for information to allow work performed in the fabricator's shop to not be subjected to Special Inspections.
- B. At the completion of fabrication, submit a certificate of compliance, to be included with the comprehensive final report of Special Inspections, stating that the materials supplied and work performed by the fabricator are in accordance the construction documents.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES MATRIX

Inspector	Responsibility	Condition
SIOR	a. Supervise all Special Inspectors required by the contract documents and the IBC. b. Submit a SIOR Letter of Acceptance to the Contracting Officer attesting to acceptance of the duties of SIOR, signed and sealed by the SIOR.	Applicable when SIOR is required

Inspector	Responsibility	Condition
	c. Verify the qualifications of all of the Special Inspectors. d. Verify the qualifications of fabricators.	
	e. Prepare a Special Inspections Project Manual, which will cover the following: 1. Roles and responsibilities of the following individuals during Special Inspections: SIOR, SI, General Contractor, Subcontractors, QC Manager, and DOR. 2. Organizational chart and/or communication plan, indicating lines of communication 3. Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors. Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors. 4. Indicate the government reporting procedures. 5. Propose forms or templates to be used by SI and SIOR to document inspections. 6. Indicate procedures for tracking nonconforming work and verification that corrective work is complete. 7. Indicate how the SIOR and/or SI will participate in weekly QC meetings. 8. Indicate how Special Inspections of shop fabricated items will be handled when the fabricator's shop is not certified per paragraph FABRICATOR SPECIAL INSPECTIONS. 9. Include a section in the manual that covers each specific item requiring Special Inspections that is indicated on the Schedule of Special Inspections. Provide names and qualifications of each special inspector who will be performing the Special Inspections for each specific item. Provide detail on how the Special Inspections are to be carried out for each item so that the expectations are clear for the General Contractor and the Subcontractor performing the work. Make a copy of the Special Inspections Project Manual available on the job site during	Applicable when SIOR is required

Inspector	Responsibility	Condition
	construction. Submit a copy of the Special Inspections Project Manual for approval. f. Attend coordination and mutual understanding meeting where the information in the Special Inspections Project Manual will be reviewed to verify that all parties have a clear understanding of the Special Inspections provisions and the individual duties and responsibilities of each party. g. Maintain a 3- ring binder for the Special Inspector's daily and biweekly reports and the Special Inspections Project Manual. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the DOR. h. Submit a copy of the Special Inspector's daily reports to the QC Manager. i. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report. j. Submit a biweekly Special Inspections report until all work requiring Special Inspections is complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following: 1. A brief summary of the work performed during the reporting time frame. 2. Changes and/or discrepancies with the drawings, specifications, and mechanical or electrical component certification if they require seismic systems, that were observed during the reporting period. 3. Discrepancies which were resolved or corrected. 4. A list of nonconforming items requiring resolution. 5. All applicable test results including nondestructive testing reports.	
QC Manager	a. If there is no SIOR, QC Manager must Supervise all Special Inspectors required by the contract documents and the IBC; Verify the qualifications of all of the Special Inspectors; Verify the qualifications of fabricators; Maintain a 3-ring binder for the Special Inspector's daily	Applicable when SIOR is not required

Inspector	Responsibility	Condition
	and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the DOR.	
	b. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.	n/a
Special Inspectors	a. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections. b. Attend preparatory phase meetings related to the Definable Feature of Work (DFOW) for which the special inspector is qualified to inspect.	
	c. Submit a copy of the daily reports to the QC Manager. d. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report. e. Submit a biweekly Special Inspection Report until all inspections are complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following: 1. A brief summary of the work performed during the reporting time frame 2. Changes and/or discrepancies with the drawings, specifications, and mechanical or electrical component certification if they require seismic systems that were observed during the reporting period. 3. Discrepancies which were resolved or corrected. 4. A list of nonconforming items requiring resolution. 5. All applicable test result including nondestructive testing reports. j. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project and corrections of all discrepancies noted in the	Applicable when SIOR is not required

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Inspector	Responsibility	Condition
	daily reports. The comprehensive final report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.	
	k. Submit daily reports to the SIOR	Applicable when SIOR is required

3.2 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Government to accept such work.

-- End of Section -

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 must meet with the Contracting Officer's Representative (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 must prepare and submit to the Contracting Officer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

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

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period

of this contract. Confine activities to areas defined by the specifications and drawings.

- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms 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. Provide erosion control plans, in phases where required.
1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.

- a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 50 (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
 - b. Reuse or conserve the collected topsoil sediment as directed by the COR. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
 - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor must be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
 6. Manage borrow areas on and off Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 7. Manage and control spoil areas on Government property to limit spoil to areas on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby water courses or lakes.
 8. Protect adjacent areas from despoilment by temporary excavations and embankments.
 9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.

11. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
 1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
 3. Monitor water areas affected by construction.
- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.
- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of North Dakota and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
 1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard

- or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property must 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 meter (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	VIBRATORS	75
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	PNEUMATIC TOOLS	80
PAVERS, STATIONARY	80	COMPRESSORS	75
GENERATORS	75		

- b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.
- G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor must restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor must leave the construction area in a clean condition satisfactory to the COR. Cleaning must 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.

- - - E N D - - -

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills must be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible must be salvaged, recycled or reused.
- C. Contractor must 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:
- D. Waste Management Plan development and implementation.
- E. Techniques to minimize waste generation.
- F. Sorting and separating of waste materials.
- G. Salvage of existing materials and items for reuse or resale.
- H. Recycling of materials that cannot be reused or sold.
- I. At a minimum the following waste categories must 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. Sheathings
 - 8. Cardboard, paper and packaging.
 - 9. Bitumen roofing materials.
 - 10. Plastics (eg, ABS, PVC).
 - 11. Carpet and/or pad.
 - 12. Gypsum board.
 - 13. Insulation.
 - 14. Paint.
 - 15. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.
 - 1. D. Division 1 Sustainability specifications

1.3 QUALITY ASSURANCE

- A. Contractor must practice efficient waste management when sizing, cutting and installing building products. Processes must 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 must develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.
- D. Contractor must 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 must accrue to the contractor.
- E. Contractor must provide all demolition, removal and legal disposal of materials. Contractor must ensure that facilities used for recycling, reuse and disposal must be permitted for the intended use to the extent required by local, state, federal regulations.
- F. Contractor must 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 must 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 must 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.
 - a) The names and locations of mixed debris reuse and recycling facilities or sites.
 - b) The names and locations of trash disposal landfill facilities or sites.
 - c) 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.
- E. Target waste diversion rate by material and an overall diversion rate.
- F. Final report documenting the results of implementation of the preconstruction waste management plan.

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 must be met.
- B. U.S. Green Building Council (USGBC): LEED Green Building Rating System for New Construction
 - 1. Green Building Initiative (GBI): Green Globes for New Construction 2019

1.7 RECORDS

- A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records must 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 must be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

- A. Contractor must 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.

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Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

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Bid Documents

- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled must 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.

- - - E N D - - -

SECTION 01 81 13
SUSTAINABLE CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes general requirements and procedures to comply with federal mandates and U.S. Department of Veterans Affairs (VA) policies for sustainable construction.
- B. The Design Professional has selected materials and utilized integrated design processes that achieve the Government's objectives. Contractor is responsible to maintain and support these objectives in developing means and methods for performing work and in proposing product substitutions or changes to specified processes. Obtain approval from Contracting Officer for all changes and substitutions to materials or processes. Proposed changes must meet, or exceed, materials or processes specified.

1.2 RELATED WORK

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

1.3 DEFINITIONS

- A. Recycled Content: Recycled content of materials is defined according to Federal Trade Commission Guides for the Use of Environmental Marketing Claims (16 CFR Part 260). Recycled content value of a material assembly is determined by weight. Recycled fraction of assembly is multiplied by cost of assembly to determine recycled content value.
 - 1. "Post-Consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Pre-Consumer" material is defined as material diverted from waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.
- B. Biobased Products: Biobased products are derived from plants and other renewable agricultural, marine, and forestry materials and provide an

alternative to conventional petroleum derived products. Biobased products include diverse categories such as lubricants, cleaning products, inks, fertilizers, and bioplastics.

- C. Low Pollutant-Emitting Materials: Materials and products which are minimally odorous, irritating, or harmful to comfort and well-being of installers and occupants.
- D. Volatile Organic Compounds (VOC): Chemicals that are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

1.4 REFERENCE STANDARDS

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

1.5 SUBMITTALS

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

all materials on Project in categories described under Low Pollutant-Emitting Materials in 01 81 13.

D. Construction Indoor Air Quality (IAQ) Management Plan:

1. Not more than 30 days after Preconstruction Meeting provide a Construction IAQ Management Plan as an electronic file including descriptions of the following:
 - a. Instruction procedures for meeting or exceeding minimum requirements of ANSI/SMACNA 008-2008, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling.
 - b. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage.
 - c. Schedule of submission of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials.
 - d. Instruction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille.
 - e. Instruction procedure for replacing all air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit.
 - f. Instruction procedures and schedule for implementing building flush-out.

E. Product Submittals:

1. Recycled Content: Submit product data from manufacturer indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content (excluding MEP systems equipment and components).
2. Biobased Content: Submit product data for products to be installed or used which are included in any of the USDA BioPreferred program's product categories. Data to include percentage of biobased content and source of biobased material.
3. Low Pollutant-Emitting Materials: Submit product data confirming compliance with relevant requirements for all materials on Project in categories described under Low Pollutant-Emitting Materials in 01 81 13.

4. For applicable products and equipment, submit product documentation confirming ENERGY STAR label, FEMP certification, WaterSense, and/or EPEAT certification.
- F. Sustainable Construction Progress Reports: Concurrent with each Application for Payment, submit a Sustainable Construction Progress Report to confirm adherence with Sustainability Action Plan.
1. Include narratives of revised strategies for bringing work progress into compliance with plan and product submittal data.
 2. Include updated and current Low Pollutant-Emitting Materials Tracking Spreadsheet.
 3. Include construction waste tracking, in tons or cubic yards, including waste description, whether diverted or landfilled, hauler, and percent diverted for comingled quantities; and excluding land-clearing debris and soil. Provide haul receipts and documentation of diverted percentages for comingled wastes.
- G. Closeout Submittals: Within 14 days after Substantial Completion provide the following:
1. Final version of Low Pollutant-Emitting Materials Tracking Spreadsheet.
 2. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed air handling units are used during construction.
 3. Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for final filtration media in air handling units.
 4. Minimum 18 construction photographs including six photographs taken on three different occasions during construction of ANSI/SMACNA 008-2008, Chapter 3 approaches employed, along with a brief description of each approach, documenting implementation of IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 5. Flush-out Documentation:
 - a. Product data for filtration media used during flush-out.
 - b. Product data for filtration media installed immediately prior to occupancy.

- c. Signed statement describing building air flush-out procedures including dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.

1.6 QUALITY ASSURANCE

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

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.
- C. Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
- D. Green Seal Standard GC-36, Commercial Adhesives, October 19, 2000.
- E. South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
- F. South Coast Air Quality Management District (SCAQMD) Rule 1168, July 1, 2005 and rule amendment date of January 7, 2005.
- G. Sheet Metal and Air Conditioning National Contractors' Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition (ANSI/SMACNA 008-2008), Chapter 3.
- H. California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor

Sources Using Environmental Chambers, Version 1.1, Emission Testing method for California Specification 01350 (CDPH Standard Method V1.1-2010).

- I. Federal Trade Commission Guides for the Use of Environmental Marketing Claims (16 CFR Part 260).
- J. ASHRAE Standard 52.2-2007.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

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

- 2) Multipurpose Construction Adhesives: 70 g/L.
 - 3) Structural Glazing Adhesives: 100 g/L.
 - 4) Metal-to-Metal Substrate Adhesives: 30 g/L.
 - 5) Plastic Foam Substrate Adhesive: 50 g/L.
 - 6) Porous Material (Except Wood) Substrate Adhesive: 50 g/L.
 - 7) Wood Substrate Adhesive: 30 g/L.
 - 8) Fiberglass Substrate Adhesive: 80 g/L.
 - 9) Architectural Non-Porous Sealant Primer: 250 g/L.
 - 10) Architectural Porous Sealant Primer: 775 g/L.
 - 11) Other Sealant Primer: 750 g/L.
 - 12) PVC Welding Adhesives: 510 g/L.
 - 13) CPVC Welding Adhesives: 490 g/L.
 - 14) ABS Welding Adhesives: 325 g/L.
 - 15) Plastic Cement Welding Adhesives: 250 g/L.
 - 16) Adhesive Primer for Plastic: 550 g/L.
 - 17) Contact Adhesive: 80 g/L.
 - 18) Special Purpose Contact Adhesive: 250 g/L.
 - 19) Structural Wood Member Adhesive: 140 g/L.
 - 20) Sheet Applied Rubber Lining Operations: 850 g/L.
 - 21) Top and Trim Adhesive: 250 g/L.
 - 22) Architectural Sealants: 250 g/L.
 - 23) Other Sealants: 420 g/L.
2. Aerosol adhesives applied on site within the weatherproofing membrane must comply with the following Green Seal GS-36.
 - a. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent VOCs by weight.
 - b. Aerosol Adhesive, General-Purpose Web Spray: 55 percent VOCs by weight.
 - c. Special-Purpose Aerosol Adhesive (All Types): 70 percent VOCs by weight.
 3. Paints and coatings applied on site within the weatherproofing membrane must comply with the following criteria:
 - a. VOC content limits for paints and coatings established in Green Seal Standard GS-11.
 - b. VOC content limit for anti-corrosive and anti-rust paints applied to interior ferrous metal substrates of 250 g/L established in Green Seal GC-03.

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

- b. Maximum VOC concentrations specified in CDPH Standard Method V1.1-2010, using office scenario at 14 day time point.
- 6. Composite wood and agrifiber products used within the weatherproofing membrane must contain no added urea-formaldehyde resins.
- 7. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies must not contain added urea-formaldehyde.
- C. Recycled Content:
 - 1. Any products being installed or used that are listed on EPA Comprehensive Procurement Guidelines designated product list must meet or exceed the EPA's recycled content recommendations. The EPA Comprehensive Procurement Guidelines categories include:
 - a. Building insulation.
 - b. Cement and concrete.
 - c. Consolidated and reprocessed latex paint.
 - d. Floor tiles.
 - e. Flowable fill.
 - f. Laminated paperboard.
 - g. Modular threshold ramps.
 - h. Nonpressure pipe.
 - i. Patio blocks.
 - j. Railroad grade crossing surfaces.
 - k. Roofing materials.
 - l. Shower and restroom dividers/partitions.
 - m. Structural fiberboard.
 - n. Nylon carpet and nylon carpet backing.
 - o. Compost and fertilizer made from recovered organic materials.
 - p. Hydraulic mulch.
 - q. Lawn and garden edging.
 - r. Plastic lumber landscaping timbers and posts.
 - s. Park benches and picnic tables.
 - t. Plastic fencing.
 - u. Playground equipment.
 - v. Playground surfaces.
 - w. Bike racks.
- D. Biobased Content:

1. Materials and equipment being installed or used that are listed on the USDA BioPreferred program product category list must meet or exceed USDA's minimum biobased content threshold. Refer to individual specification sections for detailed requirements applicable to that section.

a. USDA BioPreferred program categories include:

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

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

1. WaterSense categories include:

- a. Bathroom Faucets
- b. Commercial Toilets
- c. Irrigation Controllers

- d. Pre-Rinse Spray Valves
- e. Residential Toilets
- f. Showerheads
- g. Spray Sprinkler Bodies
- h. Urinals

F. Materials, products, and equipment being installed which fall into any of the following product categories must be Energy Star-labeled.

1. Applicable Energy Star product categories as of 09/14/2017 include:

a. Appliances:

- 1) Air Purifiers and Cleaners.
- 2) Clothes Dryers (Residential).
- 3) Clothes Washers (Commercial & Residential).
- 4) Dehumidifiers.
- 5) Dishwashers (Residential).
- 6) Freezers (Residential).
- 7) Refrigerators (Residential).

b. Electronics and Information Technology:

- 1) Audio/Video Equipment.
- 2) Computers.
- 3) Data Center Storage.
- 4) Digital Media Player.
- 5) Enterprise Servers.
- 6) Imaging Equipment.
- 7) Monitors.
- 8) Professional Displays.
- 9) Set-Top and Cable Boxes.
- 10) Telephones.
- 11) Televisions.
- 12) Uninterruptible Power Supplies.
- 13) Voice over Internet Protocol (VoIP) Phones.

c. Food Service Equipment (Commercial):

- 1) Dishwashers.
- 2) Fryers.
- 3) Griddles.
- 4) Hot Food Holding Cabinets.
- 5) Ice Makers.
- 6) Ovens.

7) Refrigerators and Freezers.

8) Steam Cookers.

9) Vending Machines.

d. Heating and Cooling Equipment:

1) Air-Source Heat Pumps (Residential).

2) Boilers.

3) Ceiling Fans (Residential).

4) Central Air Conditioners (Residential).

5) Ductless Heating and Cooling (Residential).

6) Furnaces (Residential).

7) Water Heaters.

8) Geothermal Heat Pumps (Residential).

9) Light Commercial Heating and Cooling Equipment.

10) Room Air Conditioners (Residential).

11) Ventilation Fans (Residential).

e. Other:

1) Decorative Light Strings.

2) Electric Vehicle Supply Equipment.

3) Laboratory-Grade Refrigerators and Freezers.

4) Light Bulbs.

5) Light Fixtures.

6) Pool Pumps.

7) Roof Products.

8) Water Coolers.

9) Windows, Doors, and Skylights.

G. Materials, products, and equipment being installed which fall into any of the following categories must be FEMP-designated. FEMP-designated product categories as of 09/14/2017 include:

1. Boilers (Commercial).

2. Dishwashers (Commercial).

3. Electric Chillers, Air-Cooled (Commercial).

4. Electric Chillers, Water-Cooled (Commercial).

5. Exterior Lighting.

6. Fluorescent Ballasts.

7. Fluorescent Lamps, General Service.

8. Ice Machines, Water-Cooled.

9. Industrial Lighting (High/Low Bay).

10. Light Emitting Diode (LED) Luminaires.

H. Electronic products and equipment being installed which fall into any of the following categories must be EPEAT registered. Electronic products and equipment covered by EPEAT program as of 09/14/2017 include:

1. Computers.
2. Displays.
3. Imaging Equipment.
4. Televisions.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Construction Indoor Air Quality Management:

1. During construction, meet or exceed recommended control measures of ANSI/SMACNA 008-2008, Chapter 3.
2. Protect stored on-site and installed absorptive materials from moisture damage.
3. If permanently installed air handlers are used during construction, filtration media with a minimum efficiency reporting value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda). Replace all filtration media immediately prior to occupancy.
4. Perform building flush-out as follows:
 - a. After construction ends, prior to occupancy and with interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and a relative humidity no higher than 60 percent. OR
 - b. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it must be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or design minimum outside air rate determined until a total of 14000 cu. ft./sq. ft. of outside air has been delivered to the space. During each day of flush-out

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period, ventilation must begin a minimum of three hours prior to
occupancy and continue during occupancy.

-----END-----

SECTION 01 91 00
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

- A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS must form the basis of the construction phase commissioning process and procedures. The Commissioning Agent must add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.
- B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 7, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor must 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 must be provided and copies of documentation, as required by those specifications must be submitted to the VA and the Commissioning Agent to be indexed for future reference.
- D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 7, Division 8, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.
- E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process must encompass and coordinate the system documentation, equipment startup,

control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
 2. Verify and document proper integrated performance of equipment and systems.
 3. Verify that Operations & Maintenance documentation is complete.
 4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
 5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
 6. Document the successful achievement of the commissioning objectives listed above.
- F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

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 VHA 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 VHA 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 VHA 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 VHA COR.

- C. Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.
- D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and VHA 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 are to 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 VHA 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 VHA COR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or VHA COR will issue an official directive to this effect.
 4. All parties to the Commissioning Process must be individually responsible for alerting the VHA 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 Contracting Officer or VHA 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. Section 01 32.16.15 PROJECT SCHEDULES (SMALL PROJECTS -
DESIGN/BID/BUILD)
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- D. Section 01 81 13 SUSTAINABLE CONSTRUCTION REQUIREMENTS
- E. Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.
- F. Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.
- G. Section 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS.

1.4 SUMMARY

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

1.5 ACRONYMS

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)
COR	Contracting Officer's Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent

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

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Systems To Be Commissioned	
System	Description
Specialties	
Fire Suppression	
Plumbing	
Domestic Water Distribution	Booster pumps, backflow preventers, water softeners, potable water storage tanks
Domestic Hot Water Systems	Water heaters**, heat exchangers, circulation pumps, point-of-use water heaters*
Sewerage Pump Systems	Sewage ejectors
Wastewater Pump Systems	Sump pumps
Sanitary Waste Interceptors	Grease interceptors, acid neutralizers
General Service Air Systems	Packaged compressor systems, air dryers, filtration
Medical Air Systems	Packaged medical air compressor units. Outlet certification, cross-connection verification
Medical Vacuum Systems	Packaged medical vacuum units, outlet certification, cross-connection verification
Reverse-Osmosis Systems	Packaged Reverse-Osmosis systems
Water De-Alkalizing Systems	Package Water De-Alkalizing systems
HVAC	
Noise and Vibration Control	Noise and vibration levels for critical equipment such as Air Handlers, Chillers, Cooling Towers, Boilers, Generators, etc. will be commissioned as part of the system commissioning

Systems To Be Commissioned	
System	Description
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]
Chilled Water System**	Chillers (centrifugal, rotary screw, air-cooled), pumps (primary, secondary, variable primary), VFDs associated with chilled water system components, DDC Control Panels (including integration with Building Control System)
Condenser Water System**	Cooling Towers, Fluid Coolers, heat exchangers/economizers, pumps, VFDs associated with condenser water system components, DDC control panels.
Steam/Heating Hot Water System**	Boilers, boiler feed water system, economizers/heat recovery equipment, condensate recovery, water treatment, boiler fuel system, controls, interface with facility DDC system.
HVAC Air Handling Systems**	Air handling Units, packaged rooftop AHU, Outdoor Air conditioning units, humidifiers, DDC control panels
HVAC Ventilation/Exhaust Systems	General exhaust, toilet exhaust, laboratory exhaust, isolation exhaust, room pressurization control systems
HVAC Energy Recovery Systems**	Heat Wheels, Heat Recovery Loops, AHU Integrated Heat Recovery
HVAC Terminal Unit Systems**	VAV Terminal Units, CAV terminal units, fan coil units, fin-tube radiation, unit heaters
Decentralized Unitary HVAC Systems*	Split-system HVAC systems, controls, interface with facility DDC

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Systems To Be Commissioned	
System	Description
Unitary Heat Pump Systems**	Water-source heat pumps, controls, interface with facility DDC
Humidity Control Systems	Humidifiers, de-humidifiers, controls, interface with facility DDC
Hydronic Distribution Systems	Pumps, DDC control panels, heat exchangers,
Electrical	
Medium-Voltage Electrical Distribution Systems	Medium-Voltage Switchgear, Medium-Voltage Switches, Underground ductbank and distribution, Pad-Mount Transformers, Medium-Voltage Load Interrupter Switches,
Grounding & Bonding Systems	Witness 3rd party testing, review reports
Electric Power Monitoring Systems	Metering, sub-metering, power monitoring systems, PLC control systems
Electrical System Protective Device Study	Review reports, verify field settings consistent with Study
Secondary Unit Substations	Medium-voltage components, transformers, low-voltage distribution, verify breaker testing results (injection current, etc)
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)
Emergency Power Generation Systems	Generators, Generator paralleling switchgear, automatic transfer switches, PLC and other control systems

Systems To Be Commissioned	
System	Description
Lighting & Lighting Control** Systems	Emergency lighting, occupancy sensors, lighting control systems, architectural dimming systems, theatrical dimming systems, exterior lighting and controls
Cathodic Protection Systems	Review 3rd party testing results.
Lightning Protection System	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
Site Utilities	
Water Utilities	City Water Service Entrance, Backflow Prevention, Pressure Control, Booster Pumps, Irrigation Systems
Sanitary Sewerage Utilities	City Sanitary Connection, Waste Treatment Systems
Storm Drainage Utilities	City Storm Water Connection, Site Storm Water Distribution
Table Notes	
** Denotes systems that LEED requires to be commissioned to comply with the LEED Fundamental Commissioning pre-requisite.	

1.8 COMMISSIONING TEAM

A. The commissioning team must 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. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. The GC must engage the CxA. The CxA must 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. 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. User: Representatives of the facility user and operation and maintenance personnel.

2. A/E: Representative of the Architect and engineering design professionals.

1.9 VA'S COMMISSIONING RESPONSIBILITIES

A. 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.

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

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

- C. The Contractor must ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.
- D. The Contractor must ensure that each installing subcontractor must 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 must 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 must 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 must 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 must 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, must 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 must 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 must 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 must be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.
- E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.
- F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.
1. Creating an Commissioning Issues Log Entry:
 - a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
 - b. Assign a descriptive title for the issue.

- c. Identify date and time of the issue.
 - d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
 - e. Identify system, subsystem, and equipment to which the issue applies.
 - f. Identify location of system, subsystem, and equipment.
 - g. Include information that may be helpful in diagnosing or evaluating the issue.
 - h. Note recommended corrective action.
 - i. Identify commissioning team member responsible for corrective action.
 - j. Identify expected date of correction.
 - k. Identify person that identified the issue.
2. Documenting Issue Resolution:
- a. Log date correction is completed or the issue is resolved.
 - b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
 - c. Identify changes to the Contract Documents that may require action.
 - d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
 - e. Identify person(s) who corrected or resolved the issue.
 - f. Identify person(s) verifying the issue resolution.
- G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It must 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 must 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 must 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 must 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 must 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 VHA 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 must incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.
- B. Within 21 days of contract award, the Contractor must designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager must be the single point of contact and communications for all commissioning related services by the Contractor.
- C. Within 30 days of contract award, the Contractor must ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor must 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 must ensure that all Commissioning Representatives must 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 must be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration: The Contractor must 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 must 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 must work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor must 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 must address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor must 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 must 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 must coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The Contractor must 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 must be provided by the Contractor.
- C. All testing equipment must 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 must 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 must 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 must be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags must be affixed or certificates readily available.

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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 RE = VHA COR 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
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Construction Commissioning Kick Off meeting	L	A	P	P	O	
	Commissioning Meetings	L	A	P	P	O	
	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	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	

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Construction Phase		CxA = Commissioning Agent RE = VHA COR A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
	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	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
Reports and	Status Reports	L	A	R	R	O	

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

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

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Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	S	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

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

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Warranty Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = VHA COR A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					P = Participate A = Approve R = Review O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Post-Occupancy User Review Meeting	L	A	O	P	P	
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	
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 must 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 must 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 must 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 must 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 must be identified in the Startup Plan and in the checklist forms.
 - a. The Contractor must 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 must 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 must 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 must 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 must 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 must 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. Threee (3) weeks prior to equipment startup, the Contractor must schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout must 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 must 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 must 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 must 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 must 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 must correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and must notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor must 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 must be responsible for resolution of deficiencies as directed the VA.

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 must 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 must 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 must 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 must 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 must be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which must 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 must 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 must 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 must 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 must occur before, during and after Systems Functional Performance Testing. The Contractor must be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steadystate conditions as well as during the System Functional Testing. These graphical reports must be submitted to the VHA COR and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor must 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 must implement any changes as directed by the VHA COR. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the VHA COR, prior to the execution of Systems Functional Performance Testing.
 - 2. Dynamic plotting - The Contractor must 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 must be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

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

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Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
RA Pre-Filter Status	AI	None	None	None	N/A		
OA Pre-Filter Status	AI	None	None	None	N/A		
After Filter Status	AI	None	None	None	N/A		
SA Flow	AI	15 Min	24 hours	3 days	C	±10% from SP	10 min
OA Supply Temp	AI	15 Min	24 hours	3 days	P	±5°F from SP	10 min
RA Supply Temp	AI	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AI	15 Min	24 hours	3 days	N/A		
OA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
RA Flow	AI	15 Min	24 hours	3 days	P	±10% from SP	5 min
Initial UVC Intensity (%)	AI	None	None	None	N/A		
Duct Pressure	AI	15 Min	24 hours	3 days	C	±25% from SP	6 min
CO2 Level	AI	15 Min	24 hours	3 days	P	±10% from SP	10 min
Supply Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Return Fan Status	DI	COV	24 hours	3 days	C	Status <> Command	10 Min
High Static Status	DI	COV	24 hours	3 days	P	True	1 min
Fire Alarm Status	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 1	DI	COV	24 hours	3 days	C	True	10 min
Freeze Stat Level 2	DI	COV	24 hours	3 days	C	True	5 min
Freeze Stat Level 3	DI	COV	24 hours	3 days	P	True	1 min
Fire/Smoke Damper Status	DI	COV	24 hours	3 days	P	Closed	1 min

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Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Emergency AHU Shutdown	DI	COV	24 hours	3 days	P	True	1 min
Exhaust Fan #1 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #2 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
Exhaust Fan #3 Status	DI	COV	24 hours	3 days	C	Status <> Command	10 min
OA Alarm	DI	COV	24 hours	3 days	C	True	10 min
High Static Alarm	DI	COV	24 hours	3 days	C	True	10 min
UVC Emitter Alarm	DI	COV	24 hours	3 days	P	True	10 min
CO2 Alarm	DI	COV	24 hours	3 days	P	True	10 min
Power Failure	DI	COV	24 hours	3 days	P	True	1 min
Supply Fan Speed	AO	15 Min	24 hours	3 days	N/A		
Return Fan Speed	AO	15 Min	24 hours	3 days	N/A		
RA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA CHW Valve Position	AO	15 Min	24 hours	3 days	N/A		
OA HW Valve Position	AO	15 Min	24 hours	3 days	N/A		
Supply Fan S/S	DO	COV	24 hours	3 days	N/A		
Return Fan S/S	DO	COV	24 hours	3 days	N/A		
Fire/Smoke Dampers	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
AHU Energy	Calc	1 Hour	30 day	N/A	N/A		

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Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay

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

4-Pipe Fan Coil Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
Pre-Filter Status	AI	None	None	None	M	> SP	1 hour

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4-Pipe Fan Coil Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Water Sensor	DI	COV	12 hours	3 days	M	N/A	30 Min
Cooling Coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Heating coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Fan Coil ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

2-Pipe Fan Coil Unit Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
Pre-Filter Status	AI	None	None	None	M	> SP	1 hour
Water Sensor	DI	COV	12 hours	3 days	M	N/A	30 Min
Cooling Coil Valve Position	AO	15 Minutes	12 hours	3 days	N/A		
Fan Coil ON/OFF	DO	COV	12 hours	3 days	M	Status <> Command	30 min

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

Steam and Condensate Pumps Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Steam Flow (LB/HR)	AI	15 Minutes	12 hours	3 days	N/A		
Condensate Pump Run Hours	AI	15 Minutes	12 hours	3 days	N/A		
Water Meter (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
Electric Meter (KW/H)	AI	15 Minutes	12 hours	3 days	N/A		
Irrigation Meter (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
Chilled Water Flow (TONS)	AI	15 Minutes	12 hours	3 days	N/A		
Condensate Flow (GPM)	AI	15 Minutes	12 hours	3 days	N/A		
High Water Level Alarm	DI	COV	12 hours	3 days	C	True	5 Min
Condensate Pump Start/Stop	DO	COV	12 hours	3 days	P	Status <> Command	10 min

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Domestic Hot Water Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Domestic HW Setpoint WH-1	AI	15 Minute	12 Hours	3 days	N/A		
Domestic HW Setpoint WH-2	AI	15 Minute	12 Hours	3 days	N/A		
Domestic HW Temperature	AI	15 Minute	12 Hours	3 days	C	> 135 °F	10 Min
Domestic HW Temperature	AI	15 Minute	12 Hours	3 days	P	±5°F from SP	10 Min
Dom. Circ. Pump #1 Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Dom. Circ. Pump #2 Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Dom. Circ. Pump #1 Start/Stop	DO	COV	12 Hours	3 days	N/A		
Dom. Circ. Pump #2 Start/Stop	DO	COV	12 Hours	3 days	N/A		
Domestic HW Start/Stop	DO	COV	12 Hours	3 days	N/A		

Hydronic Hot Water Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
System HWS Temperature	AI	15 min	12 hours	3 days	C	±5°F from SP	10 Min
System HWR Temperature	AI	15 min	12 hours	3 days	M	±15°F from SP	300 Min
HX-1 Entering Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
HX-2 Entering Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
HX-2 Leaving Temperature	AI	15 min	12 hours	3 days	P	±5°F from SP	10 Min
System Flow (GPM)	AI	15 min	12 hours	3 days	N/A		

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Hydronic Hot Water Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
System Differential Pressure	AI	15 min	12 hours	3 days	P	±10% from SP	8 Min
				3 days			
HW Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
HW Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
HW Pump 1 VFD Speed	AO	15 Min	12 Hours	3 days	N/A		
HW Pump 2 VFD Speed	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #1 1/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #1 2/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #2 1/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station #2 2/3 Control Valve Position	AO	15 Min	12 Hours	3 days	N/A		
Steam Station Bypass Valve Position	AO	15 Min	12 Hours	3 days	N/A		
HW Pump 1 Start/Stop	DO	COV	12 Hours	3 days	N/A		
HW Pump 2 Start/Stop	DO	COV	12 Hours	3 days	N/A		
HWR #1 Valve	DO	COV	12 Hours	3 days	N/A		
HWR #2 Valve	DO	COV	12 Hours	3 days	N/A		

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Chilled Water System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Chiller 1 Entering Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Leaving Temperature	AI	15 Minutes	12 Hours	3 days	P	±5°F from SP	10 Min
Chiller 1 Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Percent Load	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 KW Consumption	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Entering Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Leaving Temperature	AI	15 Minutes	12 Hours	3 days	P	±5°F from SP	10 Min
Chiller 2 Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Percent Load	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 KW Consumption	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Decoupler Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Supply Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Differential Pressure	AI	15 Minutes	12 Hours	3 days	P	±5% from SP	10 Min
Secondary Loop Flow	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Supply Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Return Temperature	AI	15 Minutes	12 Hours	3 days	N/A		

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Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Secondary Loop Tonnage	AI	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Primary Loop Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Secondary Loop Pump 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Secondary Loop Pump 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 1 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 1 Evaporator Iso-Valve	DI	COV	12 Hours	3 days	N/A		
Chiller 1 Evaporator Flow Switch	DI	COV	12 Hours	3 days	N/A		
Chiller 1 Unit Alarm	DI	COV	12 Hours	3 days	C	True	10 Min
Chiller 2 Status	DI	COV	12 Hours	3 days	C	Status <> Command	30 min
Chiller 2 Evaporator Iso-Valve	DI	COV	12 Hours	3 days	N/A		
Chiller 2 Evaporator Flow Switch	DI	COV	12 Hours	3 days	N/A		
Chiller 2 Unit Alarm	DI	COV	12 Hours	3 days	C	True	10 Min
Refrigerant Detector	DI	COV	12 Hours	3 days	C	True	10 Min
Refrigerant Exhaust Fan Status	DI	COV	12 Hours	3 days	M	Status <> Command	30 min
Emergency Shutdown	DI	COV	12 Hours	3 days	P	True	1 Min

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Chilled Water System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Primary Loop Pump 1 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Primary Loop Pump 2 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Pump 1 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Pump 2 VFD Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Primary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Primary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Chiller 1 Enable	DO	COV	12 Hours	3 days	N/A		
Chiller 1 Iso-Valve Command	DO	COV	12 Hours	3 days	N/A		
Chiller 2 Enable	DO	COV	12 Hours	3 days	N/A		
Chiller 2 Iso-Valve Command	DO	COV	12 Hours	3 days	N/A		
Refrigerant Exhaust Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		

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Condenser Water System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Chiller 1 Condenser Entering Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 1 Condenser Leaving Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser Entering Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser Leaving Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Basin Temp	AI	15 Minutes	12 Hours	3 days	P	< 45 oF	10 Min
Cooling Tower 2 Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Basin Temp	AI	15 Minutes	12 Hours	3 days	P	< 45 oF	10 Min
Condenser Water Supply Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Condenser Water Return Temp	AI	15 Minutes	12 Hours	3 days	N/A		
Outdoor Air Wet Bulb	AI	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Cooling Tower 1 Basin Heat	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 1 Heat Trace	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Cooling Tower 2 Basin Heat	DI	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Heat Trace	DI	COV	12 Hours	3 days	N/A		

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Condenser Water System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Chiller 1 Isolation Valve	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Chiller 2 Isolation Valve	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Condenser Water Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Condenser Water Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	1 min
Chiller 1 Condenser Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Chiller 2 Condenser By-Pass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Bypass Valve	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Speed	AO	15 Minutes	12 Hours	3 days	N/A		
Cooling Tower 1 Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		
Cooling Tower 2 Fan Start / Stop	DO	COV	12 Hours	3 days	N/A		
Condenser Water Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Condenser Water Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		

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Hot Water Boiler System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Outside Air Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Entering Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Leaving Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Fire Signal	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Entering Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 2 Leaving Water Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Hot Water Supply Temperature	AI	15 Minutes	12 Hours	3 days	P	±5 oF from SP	10 Min
Hot Water Return Temperature	AI	15 Minutes	12 Hours	3 days	N/A		
Secondary Loop Differential Pressure	AI	15 Minutes	12 Hours	3 days	C	±5% from SP	10 Min
Lead Boiler	AI	15 Minutes	12 Hours	3 days	N/A		
Boiler 1 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 1 Isolation Valve	DI	COV	12 Hours	3 days	N/A		

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Hot Water Boiler System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Boiler 1 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 1 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Boiler 2 Enable	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Boiler 2 Isolation Valve	DI	COV	12 Hours	3 days	N/A		
Boiler 2 on Fuel Oil	DI	COV	12 Hours	3 days	N/A		
Boiler 2 Alarm	DI	COV	12 Hours	3 days	C	True	1 Min
Combustion Dampers Open	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Secondary Pump 1 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Secondary Pump 2 Status	DI	COV	12 Hours	3 days	P	Status <> Command	10 min
Primary Pump 1 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Primary Pump 2 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 VFD Speed	AO	COV	12 Hours	3 days	N/A		
Hot Water System Enable	DO	COV	12 Hours	3 days	N/A		

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Hot Water Boiler System Trending and Alarms							
Point	Type	Trend Interval	Operationa l Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Combustion Dampers Command	DO	COV	12 Hours	3 days	N/A		
Primary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Primary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 1 Start / Stop	DO	COV	12 Hours	3 days	N/A		
Secondary Pump 2 Start / Stop	DO	COV	12 Hours	3 days	N/A		

- E. The Contractor must provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission must be recorded and resubmitted to the VHA 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 must 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 must 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 must 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 must 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. must also be tested.
- C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor must 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 must 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 must 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 must 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 must 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) must 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, must be allowed, but must 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 must 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 must 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 must be completed during systems startup and initial checkout.
- F. Setup: Each function and test must be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor must 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 must 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 must be solely the responsibility of the Contractor. Any required retesting by the Contractor must 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 must 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 must 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 must 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 must 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 must 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 must be documented on the Systems Functional Test Procedure.
 2. Every effort must 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 must 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 must 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 must 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 must reschedule the test and the test must 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 must be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response must also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
 - b. Resolutions must 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 must 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 must reschedule the test. Retesting must be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test must be solely the responsibility of the Contractor. Any required retesting by the Contractor must 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 must provide the VA with the following:

1. Within one week of notification from the VA, the Contractor must examine all other identical units making a record of the findings. The findings must be provided to the VA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor must provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which must include full equipment submittals. The proposed solutions must not significantly exceed the specification requirements of the original installation.
3. The VA must determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution must be installed by the Contractor and the VA must 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 must 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 must 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 must 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 must 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 must 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 must 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 must be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests must 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 VHA 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 must provide training and demonstration as required by other Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 sections. The Training and Demonstration must 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 must 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, fire pumps, and fire suppression systems.
 - b. Intrusion detection systems.
 - c. Conveying systems, including elevators, wheelchair lifts, escalators, and automated materials handling systems.
 - d. Medical equipment, including medical gas equipment and piping.
 - e. Laboratory equipment, including laboratory air and vacuum equipment and piping.
 - f. Heat generation, including boilers, feedwater equipment, pumps, steam distribution piping, condensate return systems, heating hot water heat exchangers, and heating hot water distribution piping.
 - g. Refrigeration systems, including chillers, cooling towers, condensers, 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. Packaged engine generators, including synchronizing switchgear/switchboards, and 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. Site utilities including lift stations, condensate pumping and return systems, and storm water pumping systems.

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.

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2. Video Format: Provide high quality color DVD color on standard size DVD disks.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

----- END -----

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies selective demolition of interior and exterior portions of building and site. This includes exterior retaining walls, walkways, ramps, fencing. Review Civil and Structural drawings for additional information. Interior selective demolition includes removal of concrete flooring, utilities, gyp bd and metal stud partitions and gypsum board ceilings.

1.2 RELATED WORK:

- A. Demolition and removal of roads, walks, curbs, and on-grade slabs outside buildings to be demolished: Section 31 20 00, EARTH MOVING
- B. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- C. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- G. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- I. Infectious Control: Section 01 35 26, SAFETY REQUIREMENTS.

1.3 PROTECTION:

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

Article PROTECTION OF EXISTING 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.
 - 3. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
 - 4. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the VHA 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 VHA COR's approval.
- G. The work shall comply with the requirements of Section 01 57 19,
TEMPORARY ENVIRONMENTAL CONTROLS.

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

1.4 UTILITY SERVICES:

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Selectively demolish and remove portions of buildings and structures,
including all appurtenances related or connected thereto, as noted
below:
 - 1. As required for installation of new utility service lines.
 - 2. To full depth within an area defined by hypothetical lines located
1500 mm (5 feet) outside building lines of new structures.
- B. Debris, including brick, concrete, stone, metals and similar materials
shall become property of Contractor and shall be disposed of by him
daily, off the Medical Center to avoid accumulation at the demolition
site. Materials that cannot be removed daily shall be stored in areas
specified by the VHA COR. Break up concrete slabs below grade that do
not require removal from present location into pieces not exceeding 600
mm (24 inches) square to permit drainage. Contractor shall dispose
debris in compliance with applicable federal, state or local permits,
rules and/or regulations.
- C. 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.
- E. Remove existing utilities as indicated or uncovered by work and
terminate in a manner conforming to the nationally recognized code
covering the specific utility and approved by the VHA COR. When Utility
lines are encountered that are not indicated on the drawings, the VHA
COR shall be notified prior to further work in that area.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris,
leave site in clean condition satisfactory to VHA COR. Clean-up shall
include off the Medical Center disposal of all items and materials

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not required to remain property of the Government as well as all debris
and rubbish resulting from demolition operations.

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SECTION 03 30 53
(SHORT FORM) CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Cast-in-place structural concrete.
 2. Slab on grade infill.
 3. Equipment pads.

1.2 RELATED WORK

- A. Section 01 45 29, TESTING LABORATORY SERVICES: Materials Testing and Inspection During Construction.
- B. Section 07 11 13, BITUMINOUS DAMPPROOFING: Bituminous Dampproofing.
- C. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS
- D. Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS: Concrete Roads, Walks, and Similar Exterior Site Work.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this Section.
- B. American Concrete Institute (ACI):
- 117-10 (R2015) Specification for Tolerances for Concrete Construction and Materials and Commentary
 - 211.1-91 (R2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 - 301/301M-16 Specifications for Structural Concrete.
 - 305.1-14 - Hot Weather Concreting.
 - 306.1-90 (R2002) Cold Weather Concreting.
 - 318/318M-19 Building Code Requirements for Structural Concrete and Commentary
 - 347R-14 - Guide to Formwork for Concrete.
 - SP-66-04- ACI Detailing Manual.
- C. ASTM International (ASTM):
- A615/A615M-20 Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
 - A996/A996M-16 Standard Specification for Rail Steel and Axle Steel Deformed Bars for Concrete Reinforcement

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-CSI-241
1-22-2025
Bid Documents

A1064/A1064M-18a Standard Specification for Carbon-Steel Wire
and Welded Wire Reinforcement, Plain and
Deformed, for Concrete

C33/C33M-18 Standard Specification for Concrete Aggregates.

C39/C39M-20 Standard Test Method for Compressive Strength
of Cylindrical Concrete Specimens.

C94/C94M-20 Standard Specification for Ready-Mixed
Concrete.

C143/C143M-20 Standard Test Method for Slump of Hydraulic
Cement Concrete.

C150/C150M-20 Standard Specification for Portland Cement.

C171-16 Standard Specification for Sheet Materials for
Curing Concrete.

C192/C192M-19 Standard practice for Making and Curing
Concrete Test Specimens in the Laboratory.

C219-20a Standard Terminology Relating to Hydraulic and
Other Inorganic Cements.

C260/C260M-10a(2016) ...Standard Specification for Air-Entraining
Admixtures for Concrete.

C494/C494M-19 Standard Specification for Chemical Admixtures
for Concrete.

C618-19 Standard Specification for Coal Fly Ash and Raw
or Calcined Natural Pozzolan for Use in
Concrete.

C881/C881M-20 Standard Specification for Epoxy-Resin-Base
Bonding Systems for Concrete.

C989/C989M-18a Standard Specification for Slag Cement for Use
in Concrete and Mortars.

C1240-20 Standard Specification for Silica Fume Used in
Cementitious Mixtures.

D1751-18 Standard Specification for Preformed Expansion
Joint Fillers for Concrete Paving and
Structural Construction (Non-extruding and
Resilient Bituminous Types).

E1155-20 Determining FF Floor Flatness and FL Floor
Levelness Numbers.

E1745-17 Standard Specification for Water Vapor
Retarders Used in Contact with Soil or Granular
Fill under Concrete Slabs.

D. International Concrete Repair Institute:

310.2R-2013 - Selecting and Specifying Concrete Surface
Preparation for Sealers, Coatings, Polymer
Overlays, and Concrete Repair.

1.4 SUBMITTALS

A. Submittal Procedures: Refer to Section 01 33 23, SHOP DRAWINGS, PRODUCT
DATA, AND SAMPLES. All items indicated below are required submittals
requiring Contracting Officer's Representative (COR) review and
approval.

B. Submittal Drawings:

1. Submit large scale drawings of reinforcing steel, including all
reinforcing bend diagrams and reinforcing details, to the COR for
review and approval.

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.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled
content percentage by weight.

E. Certificates: Certify products comply with specifications.

1. Each ready mix concrete batch delivered to site.

1.5 DELIVERY

A. Deliver each ready-mixed concrete batch with mix certification in
duplicate according to ASTM International (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 International (ASTM) C618, Class C or F including supplementary optional physical requirements. Pozzolans shall not exceed 25 percent of total cementitious materials by weight.
 2. Slag: ASTM International (ASTM) C989/C989M; Grade 80.
 3. Silica Fume: ASTM International (ASTM) C1240.
- C. Coarse Aggregate: ASTM International (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 International (ASTM) C33/C33M.
- E. Mixing Water: Fresh, clean, and potable.
- F. Air-Entraining Admixture: ASTM International (ASTM) C260/C260M.
- G. Chemical Admixtures: ASTM International (ASTM) C494/C494M.
- H. Vapor Barrier: ASTM International (ASTM) E1745, Class A with a minimum puncture resistance of 2200 g (3000 pounds); minimum 0.38 mm (15 mil) thick.
- I. Reinforcing Steel: ASTM International (ASTM) A615/A615M or ASTM International (ASTM) A996/A996M, deformed. See Structural Drawings for grade.
- J. 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.
- K. Welded Wire Fabric: ASTM International (ASTM) A1064/A1064M, plain; Grade 65; sized as indicated, unless otherwise noted on plans.
- L. Expansion Joint Filler: ASTM International (ASTM) D1751.
- M. Sheet Materials for Curing Concrete: ASTM International (ASTM) C171.
- N. Abrasive Aggregates: Aluminum oxide grains or emery grits.
- O. Liquid Densifier/Sealer: 100 percent active colorless aqueous silicate solution.

- P. 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 International (ASTM) C 1059/C 1059M, Type II.
- B. Structural Adhesive: ASTM International (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 the COR.

2.3 CONCRETE MIXES

- A. Design concrete mixes according to ASTM International (ASTM) C94/C94M, Option C.
- B. Compressive strength at 28 days: minimum 30 MPa (4,000 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 International (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
35 (5000)1,3	375 (630)	0.45	385 (650)	0.40
30 (4000)1,3	325 (550)	0.55	340 (570)	0.50
25 (3000)1,3	280 (470)	0.65	290 (490)	0.55
25 (3000)1,2	300 (500)	See 4 Below	310 (520)	See 4 Below

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
Notes: 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. 4. 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
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. Job-Mixed: Batch mix concrete in stationary mixers as specified in ASTM International (ASTM) C94/C94M.
 2. Ready-Mixed Concrete: Comply with ASTM International (ASTM) C94/C94M, except use of non-agitating equipment for transporting concrete to Site is not acceptable.

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 in Unfinished Areas: As-cast; no additional finishing required.
 - a. Mechanical rooms.
 - b. Electrical rooms.
3. 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.
4. 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.
 - f. e. At a minimum, provide grout finish 12" below finished grade where exposed concrete meets grade.

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 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
- 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 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. Plate Door Sill
 - 4. Railings

1.2 RELATED WORK

- A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.
- B. Prime and finish painting: Section 09 91 00, PAINTING.
- C. 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. Manufacturer's Literature and Data:

Grating, each type	Floor plate
Trap door	Wheel guards
Ceiling hatch	Sidewalk Access door
Manhole Covers	Safety nosing

- C. 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.
- D. Manufacturer's Certificates:
 - 1. Anodized finish as specified.

2. Live load designs as specified.

E. Design Calculations for specified live loads including dead loads.

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

1.4 QUALITY ASSURANCE

A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each product type shall be the same and be made by the same manufacturer.

C. Assembled product to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97 Wood Screws

B18.2.2-87(R2010) Square and Hex Nuts

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

A36/A36M-14 Structural Steel

A47-99(R2014) Malleable Iron Castings

A48-03(R2012) Gray Iron Castings

A53-12 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated
Welded and Seamless

A123-15 Zinc (Hot-Dip Galvanized) Coatings on Iron and
Steel Products

A240/A240M-15 Standard Specification for Chromium and
Chromium-Nickel Stainless Steel Plate, Sheet
and Strip for Pressure Vessels and for General
Applications.

A269-15 Seamless and Welded Austenitic Stainless Steel
Tubing for General Service

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-C SI-241
1-22-2025
Bid Documents

- A307-14 Carbon Steel Bolts and Studs, 60,000 PSI
Tensile Strength
- A391/A391M-07 (R2015) ...Grade 80 Alloy Steel Chain
- A786/A786M-15 Rolled Steel Floor Plate
- B221-14 Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Shapes, and Tubes
- B456-11 Electrodeposited Coatings of Copper Plus Nickel
Plus Chromium and Nickel Plus Chromium
- B632-08 Aluminum-Alloy Rolled Tread Plate
- C1107-13 Packaged Dry, Hydraulic-Cement Grout
(Nonshrink)
- D3656-13 Insect Screening and Louver Cloth Woven from
Vinyl-Coated Glass Yarns
- F436-16 Hardened Steel Washers
- F468-06 (R2015) Nonferrous Bolts, Hex Cap Screws, Socket Head
Cap Screws and Studs for General Use
- F593-13 Stainless Steel Bolts, Hex Cap Screws, and
Studs
- F1667-15 Driven Fasteners: Nails, Spikes and Staples
- D. American Welding Society (AWS):
- D1.1-15 Structural Welding Code Steel
- D1.2-14 Structural Welding Code Aluminum
- D1.3-18 Structural Welding Code Sheet Steel
- E. National Association of Architectural Metal Manufacturers (NAAMM)
- AMP 521-01 (R2012) Pipe Railing Manual
- AMP 500-06 Metal Finishes Manual
- MBG 531-09 (R2017) Metal Bar Grating Manual
- MBG 532-09 Heavy Duty Metal Bar Grating Manual
- F. Structural Steel Painting Council (SSPC)/Society of Protective
Coatings:
- SP 1-15 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. 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, Type 302 or 304.
- C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.
- C. Cast-Iron: ASTM A48, Class 30, commercial pattern.
- D. Malleable Iron Castings: A47.
- E. Primer Paint: As specified in Section 09 91 00, PAINTING.
- F. Stainless Steel Tubing: ASTM A269, type 302 or 304.
- G. 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.
- H. 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.
- d. ASTM F593 for stainless steel.

2. Screws: ASME B18.6.1.

3. Washers: ASTM F436, type to suit material and anchorage.

4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.4 FABRICATION GENERAL

A. Material

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.

6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
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.

E. Workmanship

1. General:
 - a. Fabricate items to design shown.
 - b. Furnish members in longest lengths commercially available within the limits shown and specified.
 - c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
 - d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
 - e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
 - f. Prepare members for the installation and fitting of hardware.

- g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
 - h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
- 2. Welding:
 - a. Weld in accordance with AWS.
 - b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
 - c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
 - d. Finish welded joints to match finish of adjacent surface.
- 3. Joining:
 - a. Miter or butt members at corners.
 - b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
- 4. Anchors:
 - a. Where metal fabrications are shown to be 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 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. Aluminum: NAAMM AMP 501.
 - a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
 - b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
 - c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
 - d. Painted: AA-C22R10.
3. Steel and Iron: NAAMM AMP 504.
 - a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
 - 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.
4. Stainless Steel: NAAMM AMP-504 Finish No. 4.

G. Protection:

1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. 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 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.

C. 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 flattened for anchorage to stud.
5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

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.
- I. Elevator Entrance:
 - 1. Fabricate lintel from plate bent to channel shape, and provide a minimum of 100 mm (4 inch) bearing each end.
 - 2. Cut away the front leg of the channel at each end to allow for concealment behind elevator hoistway entrance frame.

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

- A. Fabricate of checkered plate as detailed.
 - 1. Aluminum Plate: ASTM B632, 3 mm (0.125 inch) thick.
 - 2. Steel Plate: ASTM A786, 3 mm (0.125 inch thick), galvanized G90.
- B. Fabricate for anchorage with flat head countersunk bolts at each end and not over 300 mm (12 inches), o.c.

2.13 SAFETY NOSINGS (NOT USED)

2.14 LADDERS (NOT USED)

2.15 RAILINGS

A. railing assembly to support 200lb, concentrated load in any direction.

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.
 - b. Where inserts interfere with reinforcing bars, provide flanged fittings welded or threaded to posts for securing to concrete with expansion bolts.
 - c. Provide heavy pattern sliding flange base plate with set screws at base of pipe or tube posts.

6. Interior Post Anchors:

- a. Provide flanged fittings for securing fixed posts to floor with expansion bolts, unless shown otherwise.
- b. Weld or thread flanged fitting to posts at base.
- c. For securing removable posts to floor, provide close fitting sleeve insert or inverted flange base plate with stud bolts or rivets concrete anchor welded to the base plate.
- d. Provide sliding flange base plate on posts secured with set screws.
- e. Weld flange base plate to removable posts set in sleeves.

C. 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 1218 mm (4 feet) on centers between end posts.
4. Opening Guard Rails:
 - a. Fabricate rails with flanged fitting at each end to fit between wall opening jambs.
 - b. Design flange fittings for fastening with machine screws to steel plate anchored to base.

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)

2.21 STEEL PIPE BOLLARD (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. Set frames of gratings, covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.
- D. Field weld in accordance with AWS.
 - 1. Design and finish as specified for shop welding.
 - 2. Use continuous weld unless specified otherwise.
- E. 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.
- F. 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.
- G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.
- H. 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.
- C. 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.

3.3 DOOR FRAMES

- A. Secure clip angles at bottom of frames to concrete slab with expansion bolts as shown.
- B. Level and plumb frame; brace in position required.
- C. At masonry, set frames in walls so anchors are built-in as the work progresses unless shown otherwise.
- D. Set frames in formwork for frames cast into concrete.
- E. Where frames are set in prepared openings, bolt to wall with spacers and expansion bolts.

3.4 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.

3.5 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.

3.6 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.

3.7 PLATE DOOR SILL

- A. Install after roofing base flashing and counter flashing work is completed.
- B. Set in sealant and bolt to curb.

3.8 RAILINGS

A. Steel Posts:

- 1. Secure fixed posts to concrete with expansion bolts through flanged fittings except where sleeves are shown with pourable grout.
- 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 or under flange fitting as specified in Section 07 92 00, JOINT SEALANTS—on exterior posts.
- 4. Secure removable posts to concrete with either machine screws through flanged fittings which are secured to inverted flanges embedded in and set flush with finished floor, or set posts in close fitting pipe sleeves without grout.
- 5. Secure sliding flanged fittings to posts at base with set screws.
- 6. Secure fixed flanged fittings to concrete with expansion bolts.
- 7. Secure posts to steel with welds.

C. Anchor to Walls:

- 1. Anchor rails to concrete or solid masonry with machine screws through flanged fitting to steel plate.
 - a. Anchor steel plate to concrete or 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.

D. Removable Rails:

- 1. Rest rails in brackets at each end and secure to bracket with stainless steel bolts and nuts where part of a continuous railing.
- 2. Rest rail posts in sleeves where not part of a continuous railing.
Do not grout posts.

G. 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.

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3. Expansion bolt to concrete or solid masonry.
4. Toggle bolt to installed supporting frame wall and to hollow masonry unless shown otherwise.

3.9 STEEL COMPONENTS FOR MILLWORK ITEMS

Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.10 INSTALLATION OF STEEL PIPE BOLLARD (NOT USED)

3.11 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 and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

- - - E N D - - -

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

- A. Sustainable design requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. 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. Sustainable Design Submittals, as described below:
 - 1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.
 - 2. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
 - 3. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

E. Manufacturer's certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

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

1.5 QUALITY ASSURANCE:

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

1.6 GRADING AND MARKINGS:

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

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
 - NDS-15 National Design Specification for Wood Construction
 - WCD1-01 Details for Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
 - A190.1-07 Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12 (R2013) Square and Hex Bolts and Screws
 - B18.2.2-10 Square and Hex Nuts
 - B18.6.1-81 (R2008) Wood Screws
- E. American Plywood Association (APA):
 - E30-11 Engineered Wood Construction Guide

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F. ASTM International (ASTM):

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

C954-11 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness

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

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

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

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

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

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

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

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

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

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

F1667-13 Nails, Spikes, and Staples

G. American Wood Protection Association (AWPA):

AWPA Book of Standards

H. Commercial Item Description (CID):

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A-A-55615 Shield, Expansion (Wood Screw and Lag Bolt Self
Threading Anchors)

I. Forest Stewardship Council (FSC):

FSC-STD-01-001 (Ver. 4-0) FSC Principles and Criteria for Forest
Stewardship

J. Military Specification (Mil. Spec.):

MIL-L-19140E Lumber and Plywood, Fire-Retardant Treated

K. Environmental Protection Agency (EPA):

40 CFR 59 (2014) National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

L. Truss Plate Institute (TPI):

TPI-85 Metal Plate Connected Wood Trusses

M. U.S. Department of Commerce Product Standard (PS)

PS 1-95 Construction and Industrial Plywood

PS 20-10 American Softwood Lumber Standard

N. ICC Evaluation Service (ICC ES):

AC09 Quality Control of Wood Shakes and Shingles

AC174 Deck Board Span Ratings and Guardrail Systems
(Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, fire retardant treatment, and rules or standards under which produced.

1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.

C. Lumber Other Than Structural:

1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.

2. Framing lumber: Minimum extreme fiber stress in bending is 900 PSI.
3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.

D. Sizes:

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

E. Moisture Content:

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

F. Fire Retardant Treatment:

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

G. Preservative Treatment:

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

2.2 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, fire retardant treatment, and glue type.
- C. Sheathing:
 - 1. APA rated Exposure 1 or Exterior; panel grade CD or better.
 - 2. Wall sheathing:
 - a. Minimum 7/16 inch thick with supports 406 mm (16 inches) on center.
 - b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.
 - 3. Roof sheathing:
 - a. Minimum 1/2 inch thick with span rating 32/16 for supports 406 mm (16 inches) on center unless specified otherwise.
- D. Subflooring:
 - 1. Under finish wood flooring or underlayment:
 - a. APA Rated sheathing, Exposure 1. panel grade CD.
 - b. Minimum 3/4 inch thick with span rating 48/24 or greater for supports at 406 mm (16 inches) on center.
- E. Underlayment:
 - 1. APA rated Exposure 1 or Exterior, panel grade C-C Plugged.
 - 2. Minimum 6 mm (1/4 inch) thick or greater over plywood subflooring unless otherwise shown.
- F. Fire Retardant Treatment:
 - 1. Comply with Mil Spec. MIL-L-19140.
 - 2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

2.5 ROUGH HARDWARE AND ADHESIVES:

- A. Anchor Bolts:
 - 1. ASME B18.2.1 and ASME B18.2.2 galvanized, 5/8 inch 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.

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, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

E. Framing and Timber Connectors:

1. Fabricate of ASTM A653/A653M, Grade A; steel sheet not less than 1.3 mm (0.052 inch) thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.

2. Framing Angles: Angle designed with bendable legs to provide three (3) way anchors.

3. Straps:

a. Designed to provide wind and seismic ties with sizes as shown or specified.

b. Strap ties not less than 32 mm (1-1/4 inches) wide.

c. Punched for fastener.

5. Joist Hangers:

a. Fabricated of 1.6 mm (0.063 inch) minimum thick sheet, U design unless shown otherwise.

b. Heavy duty hangers fabricated of minimum 2.7 mm (0.108 inch) thick sheet, U design with bent top flange to lap over beam.

6. Timber Connectors: Fabricated of steel to shapes indicated on contract drawings.
 7. Joist Ties: Mild steel flats, 5 mm by 32 mm (3/16 inch by 1-1/4 inch) size with ends bent about 30 degrees from horizontal, and extending at least 406 mm (16 inches) onto framing. Punch each end for three (3) spikes.
 8. Wall Anchors for Joists and Rafters:
 - a. Mild steel strap, 5 mm by 32 mm (3/16 inch by 1-1/4 inch) with wall ends bent 50 mm (2 inches), or provide 9 mm by 130 mm (3/8 inch by 5 inch) pin through strap end built into masonry.
 - b. Strap long enough to extend onto three joists or rafters, and punched for spiking at each bearing.
 - c. Strap not less than 101 mm (4 inches) embedded end.
- F. Adhesives:
1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
 2. For structural laminated Wood: ASTM D2559.
 3. Adhesives to have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

- A. Conform to applicable requirements of the following:
1. AFPA NDS for timber connectors.
 2. AITC A190.1 Timber Construction Manual for heavy timber construction.
 3. AFPA WCD1 for nailing and framing unless specified otherwise.
 4. APA for installation of plywood or structural use panels.
 5. TPI for metal plate connected wood trusses.
- B. Fasteners:
1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use special nails with framing connectors.

- c. For sheathing and subflooring, select length of nails sufficient to extend 25 mm (1 inch) into supports.
- d. Use 8d or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
- e. Use 16d or larger nails for nailing through 50 mm (2 inch) thick lumber.
- f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
- g. Nailing Schedule; Using Common Nails:
 - 1) Joist bearing on sill or girder, toe nail three (3) 8d nails or framing anchor.
 - 2) Bridging to joist, toe nail each end two (2) 8d nails.
 - 3) Ledger strip to beam or girder three (3) 16d nails under each joint.
 - 4) Subflooring or Sheathing:
 - a) 152 mm (6 inch) wide or less to each joist face nail two (2) 8d nails.
 - b) Subflooring, more than 152 mm (6 inches) wide, to each stud or joint, face nail three (3) 8d nails.
 - c) Plywood or structural use panel to each stud or joist face nail 8d, at supported edges 152 mm (6 inches) on center and at intermediate supports 12 inches on center.
 - 5) Sole plate to joist or blocking, through sub floor face nail 16d nails, 406 mm (16 inches) on center.
 - 6) Top plate to stud, end nail two (2) 16d nails.
 - 7) Stud to sole plate, toe nail or framing anchor. Four (4) 8d nails.
 - 8) Doubled studs, face nail 16d at 610 mm (24 inches) on center.
 - 9) Built-up corner studs 16d at 610 mm (24 inches) (24 inches) on center.
 - 10) Doubled top plates, face nails 16d at 406 mm (16 inches) on center.
 - 11) Top plates, laps, and intersections, face nail two (2) 16d.
 - 12) Continuous header, two pieces 16d at 406 mm (16 inches) on center along each edge.
 - 13) Ceiling joists to plate, toenail three (3) 8d or framing anchor.

- 14) Continuous header to stud, four (4) 16d.
 - 15) Ceiling joists, laps over partitions, face nail three (3) 16d or framing anchor.
 - 16) Ceiling joists, to parallel rafters, face nail three (3) 16d.
 - 17) Rafter to plate, toe nail three (3) 8d or framing anchor.
Brace 25 mm (1 inch) thick board to each stud and plate, face nail three (3) 8d.
 - 18) Built-up girders and beams 20d at 812 mm (32 inches) on center along each edge.
2. Bolts:
- a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Provide toggle bolts to hollow masonry or sheet metal.
 - e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
- a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
6. Screws to Join Wood:
- a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
7. Installation of Timber Connectors:
- a. Conform to applicable requirements of the AFPA NDS.
 - b. Fit wood to connectors and drill holes for fasteners so wood is not split.

- C. Set sills or plates level in full bed of mortar on masonry or concrete walls.
 - 1. Space anchor bolts 1219 mm (4 feet) on centers between ends and within 152 mm (6 inches) of end. Stagger bolts from side to side on plates over 178 mm (7 inches) in width.
 - 2. Provide shims of slate, tile or similar approved material to level wood members resting on concrete or masonry. Do not use wood shims or wedges.
 - 3. Closely fit, and set to required lines.
- D. Cut notch, or bore in accordance with AFPA WCD1 passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.
- E. Blocking Nailers, and Furring:
 - 1. Install furring, blocking, nailers, and grounds where shown.
 - 2. Provide longest lengths practicable.
 - 3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
 - 4. Layers of Blocking or Plates:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 610 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.
- F. Floor Framing:
 - 1. Set with crown edge up.
 - 2. Keep framing at least 50 mm (2 inches) away from chimneys.
 - 3. Bear on not less than 101 mm (4 inches) on concrete and masonry, and 38 mm (1-1/2 inches) on wood and metal unless shown otherwise.
 - 4. Support joist, trimmer joists, headers, and beams framing into carrying members at same relative levels on joist hangers unless shown otherwise.
 - 5. Lap and spike wood joists together at bearing, or butt end-to-end with scab ties at joint and spike to plates. Scab tie lengths not less than 203 mm (8 inches) lap on joist ends. Install wood I beam joists as indicated in contract documents.
 - 6. Frame openings with headers and trimmer joist. Double headers carrying more than two tail joists and trimmer joists supporting

headers carrying more than one tail joist unless otherwise indicated in contract documents.

7. Drive nails through headers into joists using two (2) nails for 50 mm by 152 mm (2 inch by 6 inch); three (3) nails for 50 mm by 203 mm (2 inch by 8 inch) and four (4) nails for 50 mm by 254 mm (2 inch by 10 inch) and over in size.
8. Install nearest joist to double headers and spike joist to both header members before trimmer joist is installed and secured together.
9. Doubled joists under partitions parallel with floor joists.
10. Where joists run perpendicular to masonry or concrete, anchor every third joist to masonry or concrete with one (1) metal wall anchor. Securely spike anchors with three (3) nails to side of joist near its bottom.
11. Anchor joists running parallel with masonry or concrete walls to walls with steel flats spaced not over 1828 mm (6 feet) apart. Extend steel flats over at least three (3) joists and into masonry 101 mm (4 inches) with ends turned 50 mm (2 inches); bolt to concrete. Set top of flats flush with top of joists, and securely nail steel flats to each joist.
12. Hook ties at steel framing over top flange of steel members.
13. Nonbearing partitions running parallel with ceiling joists, install solid 50 mm (2 inch) thick bridging same depth as ceiling joists cut to fit snug between joists for securing top plate of partitions. Securely spike bridging to joists. Space 1219 mm (4 feet) on center.

G. Bridging:

1. Provide 25 mm by 75 mm (1 inch by 3 inch) lumber with ends beveled for slope.
2. Install one (1) row of bridging for joist spans over 2438 mm (8 feet), but less than 4877 mm (16 feet) long; install two (2) rows for spans over 4877 mm (16 feet) long.
3. Install an extra row of bridging between trimmer and next two (2) joists if header is more than 610 mm (2 feet) from end of trimmer or from regular row of bridging.
4. Secure with two (2) nails at ends.

5. Leave bottom ends loose until after subflooring or roof sheathing is installed.
6. Install single row of bridging at centerline of span and two (2) rows at the third points of span unless otherwise shown.

H. Roof Framing:

1. Set rafters with crown edge up.
2. Form a true plane at tops of rafters.
3. Valley, Ridge, and Hip Members:
 - a. Size for depth of cut on rafters.
 - b. Straight and true intersections of roof planes.
 - c. Secure hip and valley rafters to wall plates by using framing connectors.
 - d. Double valley rafters longer than the available lumber, with pieces lapped not less than 1219 mm (4 feet) and spiked together.
 - e. Butt joint and scab hip rafters longer than the available lumber.
4. Spike to wall plate and to ceiling joists except when secured with framing connectors.
5. Frame openings in roof with headers and trimmer rafters. Double headers carrying more than one (1) rafter unless shown otherwise.
6. Install 50 mm by 101 mm (2 inch by 4 inch) strut between roof rafters and ceiling joists at 1219 mm (4 feet) on center unless shown otherwise.

I. Framing of Dormers:

1. Frame as indicated in contract documents, with top edge of ridge beveled to pitch of roof header.
2. Set studs on doubled trimmer rafters.
3. Double studs at corners of dormers.
4. Double plate on studs and notch rafters over plate and bear at least 75 mm (3 inches) on plates.
5. Frame opening to receive window frame or louver frame.

J. Partition and Wall Framing:

1. Provide 50 mm by 101 mm (2 inch by 4 inch) studs spaced 406 mm (16 inches) on centers; unless otherwise indicated on contract documents.
2. Install double studs at openings and triple studs at corners.
3. Installation of sole plate:

- a. Anchor plates of walls or partitions resting on concrete floors in place with expansion bolts, one (1) near ends of piece and at intermediate intervals of not more than 1219 mm (4 feet) or with power actuated drive pins with threaded ends of suitable type and size, spaced 610 mm (2 feet) on center unless shown otherwise.
 - b. Nail plates to wood framing through subfloor as specified in nailing schedule.
4. Headers or Lintels:
 - a. Make headers for openings of two (2) pieces of 50 mm (2 inch) thick lumber of size shown with plywood filler to finish flush with face of studs or solid lumber of equivalent size.
 - b. Support ends of headers on top of stud cut for height of opening. Spike cut stud to adjacent stud. Spike adjacent stud to header.
5. Provide double top plates, with members lapped at least 610 mm (2-feet) spiked together.
6. Install intermediate cut studs over headers and under sills to maintain uniformity of stud spacing.
7. Provide single sill plates at bottom of opening unless otherwise indicated in contract documents. Toe nail to end stud, face nail to intermediate studs.
8. Install 50 mm (2 inch) blocking for firestopping so that maximum dimension of any concealed space is not over 2438 mm (8 feet) in accordance with AFPA WCD1.
9. Install corner bracing when plywood or structured use panel sheathing is not used.
 - a. Let corner bracing into exterior surfaces of studs at an angle of approximately 45 degrees, extended completely over walls plates, and secured at bearing with two (2) nails.
 - b. Provide 25 mm by 101 mm (1 inch by 4 inch) corner bracing.
- K. Rough Bucks:
 1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.
 2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.
 3. Cut rough bucks from 50 mm (2 inch) thick stock, of same width as partitions in which they occur and of width shown in exterior walls.

4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.

L. Subflooring:

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

M. Underlayment:

1. Where finish flooring of different thickness is used in adjoining areas, provide underlayment of thickness required to bring finish-flooring surfaces into same plane.
2. Apply to dry, level, securely nailed, clean, wood subfloor without any projections.
3. Plywood and particle underlayment are to be glue-nailed to subfloor.
4. Butt underlayment panels to a light contact with a 1 mm (1/32 inch) space between plywood or hardboard underlayment panels and walls, and approximately 9 mm (3/8 inch) between particleboard underlayment panels and walls.
5. Stagger underlayment panel end joints with respect to each other and offset joints with respect to joints in the subfloor at least 50 mm (2 inches).
6. After installation, avoid traffic on underlayment and damage to the finish surface.

N. Sheathing:

1. Provide plywood or structural-use panels for sheathing.

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2. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
3. Set nails not less than 9 mm (3/8 inch) from edges.
4. Install 50 mm by 101 mm (2 inch by 4 inch) blocking spiked between joists, rafters and studs to support edge or end joints of panels.

- - - E N D - - -

**SECTION 07 21 13
THERMAL INSULATION**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Adhesives VOC Limits.
- B. Section 07 84 00, FIRESTOPPING: Safing Insulation.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 - C1289 (2016) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - E84 (2016) Standard Test Method for Surface Burning Characteristics of Building Materials .
 - C552-17e1 Cellular Glass Thermal Insulation.
 - C553-13(2019) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - C578-19 Rigid, Cellular Polystyrene Thermal Insulation.
 - C591-20 Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - C612-14(2019) Mineral Fiber Block and Board Thermal Insulation.
 - C665-17 Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

E2357(2011) Standard Test Method for Determining Air
Leakage of Air Barrier Assemblies .
C954-18 Steel Drill Screws for the Application of
Gypsum Panel Products or Metal Plaster Base to
Steel Studs From 0.033 (0.84 mm) inch to 0.112
inch (2.84 mm) in thickness.
C1002-18 Steel Self-Piercing Tapping Screws for
Application of Gypsum Panel Products or Metal
Plaster Bases to Wood Studs or Steel Studs.
D312/D312M-16a Asphalt Used in Roofing.
E84-20 Surface Burning Characteristics of Building
Materials.
F1667-18a Driven Fasteners: Nails, Spikes, and Staples.

1.4 SUBMITTALS

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

1.5 DELIVERY

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

1.6 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

C. Protect foam plastic insulation from UV exposure.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

A. Insulation Thickness:

1. Provide thickness required by R-value shown on drawings.
2. Provide thickness indicated when R-value is not shown on drawings.

B. Insulation Types:

1. Provide one insulation type for each application.

C. Sustainable Construction Requirements:

1. Insulation Recycled Content:
 - a. Polyisocyanurate rigid foam: 9 percent recovered material.
 - b. Polyisocyanurate foam-in-place: 5 percent recovered material.
 - c. Glass fiber reinforced: 6 percent recovered material.
 - d. Rock wool material: 75 percent recovered material.
2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-Flooring Adhesives and Sealants.

2.2 THERMAL INSULATION

A. Perimeter Insulation In Contact with Soil:

1. Polyisocyanurate: ASTM C1289, Type I.

B. Exterior Framing or Continuous Insulation:

1. Polyisocyanurate: ASTM C1289, Type I.

C. Inside Face of Exterior Wall Insulation:

1. Mineral Fiber Board: ASTM C612, Type IB or II.

D. Floor Assemblies Above Unconditioned Spaces:

1. Polyisocyanurate: ASTM C1289, Type I.

2.3 ACOUSTICAL INSULATION

A. Semi Rigid, Batts and Blankets:

1. Widths and lengths to fit tight against framing.
2. Mineral Fiber boards: ASTM C553, Type II, flexible, or Type III, semi rigid unfaced.
 - a. Density: nominal 4.5 pound.
3. Mineral Fiber Batt or Blankets: ASTM C665 unfaced.

4. Maximum Surface Burning Characteristics: ASTM E84.

- a. Flame Spread Rating: 25.
- b. Smoke Developed Rating: 450.

B. Sound Deadening Board:

- 1. Mineral Fiber Board: ASTM C612, Type IB.
 - a. Thickness: 51 mm (2 inch).

2.4 ACCESSORIES

A. Fasteners:

- 1. Staples or Nails: ASTM F1667, zinc-coated, size and type to suit application.
- 2. Screws: ASTM C954 or ASTM C1002, size and length to suit application with washer minimum 50 mm (2 inches) diameter.
- 3. Impaling Pins: Steel pins with head minimum 50 mm (2 inches) diameter.
 - a. Length: As required to extend beyond insulation and retain cap washer when washer is placed on pin.
 - b. Adhesive: Type recommended by manufacturer to suit application.

B. Insulation Adhesive: Nonflammable type recommended by insulation manufacturer to suit application.

C. Tape: Pressure sensitive adhesive on one face.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install insulation with vapor barrier facing the heated side, unless indicated otherwise.
- C. Install board and block insulation with joints close and flush, in regular courses, and with end joints staggered.

- D. Install batt and blanket insulation with joints tight. Fill framing voids completely. Seal facing cuts, tears, and unlapped joints with tape.
- E. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

3.3 THERMAL INSULATION

- A. Perimeter Insulation In Contact with Soil:
 - 1. Vertical insulation:
 - a. Fill joints of insulation with same material used for bonding.
 - b. Bond polystyrene board to surfaces with adhesive.
 - c. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.
 - 2. Horizontal insulation under concrete floor slab:
 - a. Lay insulation boards and blocks horizontally on level, compacted and drained fill.
 - b. Extend insulation from foundation walls towards center of building minimum 600 mm (24 inches).
- B. Exterior Framing or Continuous Insulation:
 - 1. General:
 - a. Open voids are not acceptable.
 - b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
 - c. Pack behind outlets, around pipes, ducts, and services encased in walls.
 - d. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches (406 mm) on center in the field, vertically and horizontally, and 12 inches on center at perimeter of wall, with manufacturer recommended mechanical fasteners.
 - e. Install boards horizontally lengthwise on walls, stagger the joints.
 - f. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.
 - g. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane
 - 1) Seal around penetrations using Penetration and Gap Filler material.

- 2) Maintain continuity of air barrier by sealing the roof/wall juncture with Roof/Wall Juncture Sealing material.
2. Floor Joists: Friction fit insulation between framing to provide minimum 50 mm (2 inch) air space between insulation and subfloor.
3. Ceilings and Soffits:
 - a. Wood Framing:
 - 1) Fasten blanket insulation between wood framing and joists with nails or staples through flanged edges of insulation.
 - 2) Space fastenings maximum 150 mm (6 inches) on center.
 - b. Metal Framing:
 - 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
 - 2) At metal framing and ceilings suspension systems, install insulation above suspended ceilings and metal framing at right angles to main runners and framing.
 - 3) Tape insulation tightly together without gaps. Cover metal framing members with insulation.
 - c. Ceiling Transitions:
 - 1) In areas where suspended ceilings transition to structural ceiling, install blanket or batt insulation.
 - 2) Extend insulation from suspended ceiling to underside of structure above.
 - 3) Secure blanket and batt with continuous cleats to structure above.
- C. Floor Assemblies Above Unconditioned Spaces:
 1. Use impaling pins for attach insulation to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.
 - a. Bond insulation with adhesive when separate vapor retarder is used.

3.4 ACOUSTICAL INSULATION

- A. General:
 1. Install insulation without voids.
 2. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
 3. Pack behind outlets, around pipes, ducts, and services encased in walls.

4. Hold insulation in place with pressure sensitive tape.
5. Lap facer flanges together over framing for continuous surface. Seal all penetrations through the insulation and facers.
6. Do not compress insulation below required thickness except where embedded items prevent required thickness.

B. Semi Rigid, Batts and Blankets:

1. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedments.

a. Wood Framing:

- 1) Fasten blanket insulation between wood framing and joists with nails or staples through flanged edges of insulation.
- 2) Space fastenings maximum 150 mm (6 inches) on center.

b. Metal Framing:

- 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
- 2) At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing.
- 3) Tape insulation tightly together so no gaps occur and metal framing members are covered by insulation.

3.5 CLEANING

- A. Remove excess adhesive before adhesive sets.

3.6 PROTECTION

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

- - E N D - -

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

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Non-Flooring Adhesives and Sealants VOC Limits.
- B. Section 06 10 00, ROUGH CARPENTRY: Blocking, Edge Strips, and Plywood.
- C. Section 07 54 19, POLYVINYL-CHLORIDE (PVC) ROOFING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Society of Civil Engineers
ASCE 7-16 Minimum Design Loads and Associated Criteria
for Buildings and Other Structures
- C. American Society of Heating, Refrigeration and Air Conditioning
(ASHRAE):
Standard 90.1-13 Energy Standard for Buildings Except Low-Rise
Residential Buildings.
- D. ASTM International (ASTM):
C208-12(2017)e2 Cellulosic Fiber Insulating Board.
C552-17e1 Cellular Glass Thermal Insulation.
C726-17 Mineral Fiber Roof Insulation Board.
C728-17a Perlite Thermal Insulation Board.
C1177/C1177M-17 Glass Mat Gypsum Substrate for Use as
Sheathing.
C1278/C1278M-17 Fiber-Reinforced Gypsum Panel.
C1289-19 Faced Rigid Cellular Polyisocyanurate Thermal
Insulation Board.
C1396/C1396M-17 Gypsum Board.
D41/D41M-11 (2016) Asphalt Primer Used in Roofing, Dampproofing,
and Waterproofing.
D312/D312M-16a Asphalt Used in Roofing.

D1970/D1970M-20 Self-Adhering Polymer Modified Bituminous Sheet
Materials Used as Steep Roofing Underlayment
for Ice Dam Protection.

D2178/D2178M-15a Asphalt Glass Felt Used in Roofing and
Waterproofing.

D2822/D2822M-05(2011)e1 Asphalt Roof Cement, Asbestos Containing.

D4586/D4586M-07(2018) ..Asphalt Roof Cement, Asbestos-Free.

E84-20 Surface Burning Characteristics of Building
Materials.

F1667-18a Driven Fasteners: Nails, Spikes, and Staples.

E. National Roofing Contractors Association (NRCA):

Manual-15 The NRCA Roofing Manual: Membrane Roof Systems-
2019.

F. UL LLC (UL):

Listed Online Certifications Directory.

G. U.S. Department of Agriculture (USDA):

USDA BioPreferred Program Catalog.

H. U.S. Department of Commerce National Institute of Standards and
Technology (NIST):

DOC PS 1-19 Structural Plywood.

DOC PS 2-18 Performance Standard for Wood-Based
Structural-Use Panels.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA,
AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and installation details.

a. Nailers, and terminations.

b. Layout of insulation showing slopes, tapers, penetrations, and
edge conditions.

C. Manufacturer's Literature and Data:

1. Description of each product.

D. Samples:

1. Roof insulation, each type.

2. Fasteners, each type.

E. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Biobased Content:
 - a. Show type and quantity for each product.
3. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
 - b. Certify each composite wood and agrifiber product contain no added urea formaldehyde.

F. Qualifications: Substantiate qualifications meet specifications.

1. Installer.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY

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

1.7 STORAGE AND HANDLING

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

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Insulation Thermal Performance:

1. Any Location R-Value: RSI-17 (R-10), minimum.
- B. Fire and Wind Uplift Resistance: Provide roof insulation complying with requirements specified in Division 07 roofing section.
- C. Insulation on Combustible plywood Decking: UL labeled indicating compliance with one of the following:
 1. UL Listed.
 2. Insulation Surface Burning Characteristics: When tested according to ASTM E84.
 - a. Flame Spread Rating: 75 maximum.
 - b. Smoke Developed Rating: 150 maximum.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.
- B. Sustainable Construction Requirements:
 1. Insulation Recycled Content:
 - a. Rigid Foam: 9 percent total recycled content, minimum.
 - b. Glass Fiber Reinforced Rigid Foam: 6 percent total recycled content, minimum.
 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.
 - b. Composite wood and agrifiber.

2.3 ADHESIVES

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

- F. Roof Cement: Asbestos free, ASTM D2822/D2822M, Type I or Type II; or, ASTM D4586/D4586M, Type I or Type II.

2.4 ROOF AND DECK INSULATION

- A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, faced with glass fiber reinforced cellulosic felt facers on both major surfaces of the core foam.

2.5 INSULATION ACCESSORIES

- A. Cants and Tapered Edge Strips:
1. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
- B. Vapor Retarder:
1. Self-Adhering Sheet Vapor Retarder: ASTM D1970/D1970M, minimum 1.0 mm (40 mils) thick membrane of HDPE film fully coated with asphalt adhesive, or 0.76 to 1.0 mm (30 to 40 mils) thick membrane of butyl rubber based adhesive backed by a layer of high density cross-laminated polyethylene; maximum permeance rating of 6 ng/Pa/s/sq. m (0.1 perms).

2.6 ACCESSORIES

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions.
1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Comply with requirements of UL for insulated steel roof deck.

- C. Attach substrate board and other products to meet requirements of Division 07 roofing section.

3.4 VAPOR RETARDER INSTALLATION

A. Vapor Retarder Installation, General:

1. Install continuous vapor retarder on roofs 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.

3.5 INSULATION INSTALLATION

A. Insulation Thickness:

1. Thickness of roof insulation shown on drawings is nominal. Provide thickness required to comply with specified thermal performance.
2. When actual insulation thickness differs from drawings, coordinate alignment and location of roof drains, flashing, gravel stops, fascias and similar items.
3. Use minimum two layers of insulation when required thickness is 68 mm (2.7 inch) or greater.

B. Lay insulating units with close joints, in regular courses and with end joints staggered.

1. Stagger joints between layers minimum 150 mm (6 inches).

C. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the vapor retarder.

D. Seal cut edges at penetrations and at edges against blocking with manufacture approved sealant.

E. Cut to fit tightly against blocking or penetrations.

F. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.

G. Installation Method:

1. Mechanically Fastened Insulation:

- a. Fasten insulation according to requirements in Division 07 roofing section.
- b. Fasten insulation to resist uplift pressures specified in Division 07 roofing section and ASCE-7.

- - E N D - -

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
- B. Commercial weather barrier assemblies, Flexible flashing, Weather barrier flashing, Fluid-applied flashing, Weather barrier accessories, Drainage material.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS:
- B. Section 06 10 00, ROUGH CARPENTRY. Blocking, Studs, and Plywood.
- C. Section 07 21 13 THERMAL INSULATION; installation of exterior insulation.
- D. Section 07 40 00, SIDING PANELS; Metal siding panels.
- E. Section 07 60 00, FLASHING AND SHEET METAL; Metal flashing components.
- F. Section 07 92 00, JOINT SEALANTS; Sealants.

1.3 DEFINITIONS

- A. Weather Barrier: A combination of materials and accessories that do the following:
 - 1. Prevent the accumulation of water as a water-resistive barrier.
 - 2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.
 - 3. Provide sufficient water vapor transmission to enable drying as a vapor-permeable membrane.
- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.
- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.
- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 per

definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

1.4 APPLICABLE PUBLICATIONS

A. American Architectural Manufacturers Association (AAMA):

AAMA 711 - Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.

B. American Association of Textile Chemists and Colorists (AATCC):

AATCC-127 - Water Resistance: Hydrostatic Pressure Test.

C. ASTM International (ASTM):

ASTM D882 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

ASTM D3330 - Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape.

ASTM D3652 - Standard Test Method for Thickness of Pressure-Sensitive Tapes.

ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.5 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Physical properties, performance criteria, compliance reports, material compatibility, product limitations, and recommendations.

2. Preparation instructions and recommendations.
 3. Storage and handling requirements and recommendations.
 4. Installation methods.
- C. Shop Drawings: Provide manufacturer's typical, scaled, shop drawings with actual product names on details of:
1. Typical conditions.
 2. Transitions to adjacent systems.
 3. Mock-up, including plans and elevations.
- D. Manufacturer's Letter Indicating Compatibility: Submit letter or technical bulletin listing specific air barrier materials, and typical adjacent system materials; that are compatible, both chemically and adhesively.
- E. Qualifications:
1. Submit manufacturer and installer qualifications.
 2. Submit 5 project references within the last 5 years of similar-sized projects with self-adhered sheet membrane air barrier assembly installation by the proposed installing contractor.
- F. Warranty: Submit manufacturer's sample warranty.

1.6 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primary weather barrier materials from a single manufacturer. Secondary and accessory materials by other manufacturers shall be approved for compatibility by the primary manufacturer.
- B. Testing Laboratory Qualifications: Accredited by the International Accreditation Service (IAS), American Association for Laboratory Accreditation (A2LA), or Standards Council of Canada (SCC).
- C. Manufacturer Qualifications: Minimum 10 years of experience manufacturing similar products.
- D. Installer Qualifications: Minimum 5 years of experience installing similar products and approved by the manufacturer.

1.7 Delivery

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Store in accordance with the manufacturer's instructions in clean, dry location protected from exposure to direct sunlight. Material that has

been unwrapped shall be covered with opaque, light colored tarp or re-wrapped in manufacturer's packaging.

- C. Use air barrier materials within 24 months from date of manufacture.
- D. Handle materials to avoid damage.

1.8 WARRANTY

- A. Construction Warranty: FAR clause 52.246 21, "Warranty of Construction."
- B. Manufacturer's Product Warranty: Provide manufacturer's product warranty for a minimum of ten years from date of Substantial Completion with installation completed by a certified 3M applicator.
- C. Installer's Workmanship Warranty: Provide workmanship warranty for a minimum of one year from date of Substantial Completion including all air barrier assembly materials and accessories, against failures including loss of air tight seal, loss of watertight seal, loss of attachment, loss of adhesion, and failure to cure properly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain weather barrier assembly components from one manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures without failure due to defective manufacture of products.

2.3 WEATHER BARRIER

- A. Commercial Building Wrap: ASTM E2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

- 1. System Description, Single-Layer Weather Barrier: Single-layer weather barrier, including flashing and sealing of penetrations and seams.

2. Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA) when tested in accordance with ASTM E 2357 and evaluated by ABAA.
3. Water Penetration Resistance, Product: Hydrostatic head resistance greater than 22 inches (55 cm) in accordance with AATCC 127.
4. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E2357 to water resistance in accordance with ASTM E331 to [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)] [10.4 lbf/sq. ft. (500 Pa)] [12.5 lbf/sq. ft. (575 Pa)] [15 lbf/sq. ft. (718 Pa)]. Select one of two "Water-Vapor Permeance" subparagraphs below based on product used in single-layer system or as the primary layer used in double-layer system.
5. Water-Vapor Permeance: Not less than 23 perms (1300 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A) or not less than 28 perms (1600 ng/Pa x s x sq. m) per ASTM E96/E96M, Water Method (Procedure B).
6. Water-Vapor Permeance: Not less than 30 perms (1700 ng/Pa x s x sq. m) per ASTM E96/E96M, Water Method (Procedure B).
7. Allowable UV Exposure Time: Not less than 9 months (270 days) when tested in accordance with ASTM G155 (Accelerated Weathering).
8. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
9. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
 - a. Peak Heat Release: 13,217 Btu/sq. ft. (150 kW/sq. m).
 - b. Total Heat Release: 1762 Btu/sq. ft. (20 MJ/sq. m)
 - c. Effective Heat of Combustion: 7744 Btu/lb (18 MJ/kg)
10. Weather barrier system to have a VOC content of 30 g/L or less.

2.4 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for seven days.
 1. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.

2. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
 3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A (without primer use).
 4. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Conformable Weather Barrier Flashing for Sealing Penetrations: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
- C. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for seven days.
1. Conformability: Able to create a continuous watertight seal around penetrations from weather barrier to penetration without cuts, patches, or fasteners.
 2. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
 3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (minus 4 deg C) as Class A (without primer use).
 4. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- 5.
- D. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for seven days.
1. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
 2. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A without primer use.
 3. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

- E. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, **dual-sided**, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
- F. Strip Flashing: Composite flashing material composed of **polypropylene** laminate with 100 percent butyl-based, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
1. Water Penetration: No leakage at 6.24 psf (300 Pa) per ASTM E 331.
 2. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A without primer use.
 3. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

2.5 WEATHER BARRIER ACCESSORIES

- A. Building Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.
- B. Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with **[1-inch- (25-mm)] [2-inch- (50-mm-)]** diameter, high-density polyethylene cap washers with UV inhibitors.
- C. Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.
1. Peel Adhesion Test: Passes in accordance with ASTM D3330, Test Method F, for the following.
 - a. Peel Angles: 0, 25, 72, and 180 degrees.
 - b. Substrates: Concrete masonry units (CMUs), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
 2. Chemical Compatibility: Pass; AAMA 713.
 3. Flame Spread Index: 5; ASTM E84.
 4. Smoke Development Index: 0; ASTM E84.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
 - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
 - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written installation guidelines and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.
 - 1. Maintain continuity of air and water barrier assemblies.
 - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
 - 3. Install weather barrier horizontally starting at lower portion of wall surface.
 - 4. Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.

1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according to weather barrier manufacturer's installation guidelines.
1. Do not use temporary fasteners to permanently attach weather barrier.
 2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings in accordance with weather barrier manufacturer's installation guidelines.
1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
 2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
 3. Install flashing in accordance with weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
 2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
 3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
 4. Lap weather barrier flashing a minimum of 2 inches (50 mm) onto weather barrier.
 5. Apply pressure over entire surface using roller or firm hand pressure

- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
1. Apply [6-inch- (150-mm-)] [9-inch- (230-mm-)] wide conformable weather barrier flashing at door and window sills.
 2. Ensure that sill flashing does not slope to the interior.
 3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
 4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
 5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
 6. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.
1. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant.
Integrate products with flanges into the weather barrier.
- D. Terminations: Provide minimum 2 inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
1. Secure weather barrier with fasteners and weather barrier flashing.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to train installers and observe subject test-wall areas and installations.

3.6 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material.

3.7 PROTECTION

- A. Protect installed weather barrier from the following:

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-C SI-241
1-22-2025
Bid Documents

1. Damage from cladding, structure, or a component of the structure (for example, window, door, or wall system).
2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
4. UV exposure in excess of products' stated limits.

- - - - END - - - -

SECTION 07 40 00
SIDING PANELS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies uninsulated metal wall panels as shown on contract documents.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Section 07 21 13, THERMAL INSULATION: Rigid Insulation
- C. Section 07 25 00, WEATHER BARRIERS: Sheet waterproofing.
- D. Section 07 92 00, JOINT SEALANTS: Sealant.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide metal wall panels 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 roofing and siding panels of type and scope equivalent to Work of this Section. Submit installer qualifications.

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 recycled content as specified in PART 2 - PRODUCTS.
- C. Samples: Metal panel, 152 mm (6 inch) square, showing finish, each color and texture.
- D. Shop Drawings: Wall panels, showing details of construction and installation. Thickness and kind of material, closures, flashing, 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.
- E. Manufacturer's Literature and Data: Wall panels
- F. Fire Test Report: Report of fire test by recognized testing laboratory for fire rating specified, showing details of construction.
- G. Manufacturer's Certificates: Indicating manufacturer's qualifications specified.

- H. Installer qualifications.
- I. Manufacturer warranty.

1.5 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 roofing and 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.

1.6 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 (5) 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 and 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.

1.7 APPLICABLE PUBLICATIONS

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

B. American Architecture Manufacturers Association (AAMA):

611-14 Anodized Architectural Aluminum

621-02 Voluntary Specifications for High Performance
Organic Coatings on Coil Coated Architectural
Hot Dipped Galvanized (HDG) and Zinc-Aluminum
Coated Steel Substrates

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):

A463/A463M-15 Steel Sheet, Cold-Rolled, Aluminum-Coated, by
the Hot-Dip Process

A653/A653M-20 Steel Sheet, Zinc-Coated (Galvanized), or Zinc-
Iron Alloy-Coated (Galvannealed) by the Hot-Dip
Process.

A924/A924M-19 Steel Sheet, Metallic Coated by the Hot-Dip
Process

A1008/A1008M-18 Steel, Sheet, Cold-Rolled, Carbon, Structural,
High Strength Low Alloy

B209-14 Aluminum and Aluminum Alloy Sheet and Plate

B209M-14 Aluminum and Aluminum Alloy Sheet and Plate
(Metric)

C553-19 Mineral Fiber Blanket Thermal Insulation for
Commercial and Industrial Applications

C591-20. Unfaced Preformed Rigid Cellular
Polyisocyanurate Thermal Insulation

C612-14 (2019) Mineral Fiber Block and Board Thermal
Insulation

C1396/C1396M-17 Gypsum Board

- D2244-16 Calculation of Color Tolerances and Color
Differences from Instrumentally Measured Color
Coordinates
- D4214-07(2015) Test Methods for Evaluating the Degree of
Chalking of Exterior Paint Films
- E119-20 Fire Test of Building Construction and
Materials
- E283-19 Test Method for Determining Rate of Air Leakage
Through Exterior Windows, Curtain Walls, and
Doors Under Specified Pressure Differences
Across the Specimen
- E331-00(2016) Test Method for Water Penetration of Exterior
Windows, Skylight, Doors, and Curtain Walls by
Uniform Static Air Pressure Difference
- E1592-05(2017) Standard Test Method for Structural Performance
of Sheet Metal Roof and Siding Systems by
Uniform Static Air Pressure Method
- E1646-95(2018) Test Method for Water Penetration of Exterior
Metal Roof Panel Systems by Uniform Static Air
Pressure Difference
- E1680-16 Test Method for Rate of Air Leakage Through
Exterior Metal Roof Panel Systems
- E1980-11(2019) Calculating Solar Reflectance Index of
Horizontal and Low-Sloped Opaque Surfaces
- E2140-01(2017) Test Method for Water Penetration of Metal Roof
Panel Systems by Static Water Pressure Head
- E. Cool Roof Rating Council (CRRC):
Standard-14
- F. FM Global:
4471-10 Class 1 Panel Roofs
- G. Underwriters Laboratories (UL):
580-05(R2018) Tests for Uplift Resistance of Roof Assemblies
Fire Resistance Directory

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS FOR WALL PANELS

- A. Basis of Design: AEP Span, a Division of ASC Prfields, LLC. PBR Panel;
Color, "LIGHT STONE".

- B. 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: As indicated on drawings.
 - 2. Other Design Loads: As indicated.
 - 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
 - 4. Minimum Panel rib depth: 3/16"
 - 5. Panel width: 36 inches.
- C. Air Infiltration: Air leakage of not more than 0.3 liter/second per square meter (0.06 cfm/square foot) when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 75 Pa (1.57 pound/square foot)
- D. 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 pound force/square foot)
- E. 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.

2.2 SHEET STEEL

- A. Minimum 0.8 mm (0.31 inch) thick for wall panels.
- B. Steel, Sheet, Galvanized: ASTM A653/A653M and AISI SG03-3, Structural.
 - 1. Grade 40, galvanized coating conforming to ASTM A924/A924M, Class Z 275 G-90.
- C. Steel, Sheet, Commercial: ASTM A1008, Type C.
- D. Steel, Sheet, Aluminized: ASTM A463/A463M and AISI SG03-3. Steel to be coated on both sides with 0.15 Kg/square meter (0.5 ounce of aluminum per square foot).
- E. Recycled Content of Steel Products: Postconsumer recycled content not less than 30 percent.

2.3 ALUMINUM PLATE AND SHEET

- A. ASTM B209M (B209).

2.4 FASTENERS

- A. Fasteners of size, type and holding strength as recommended by panel manufacturer.

2.5 FABRICATION

- A. General:

1. Furnish panels in one continuous length for full height, or at least one story height for wall panels 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 metal and bituminous closures, fastenings, flashing, clip, caulking, panel reinforcements for support of mechanical and electrical work as shown on the contract documents or recommended by the manufacture, and related components and accessories.
 - a. 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. Fabricate wall louvers and frames used in conjunction with walls panels to be of same material, thickness and finish as exterior face sheets of wall system. Louver assembly to be designed and installed to prevent infiltration of water into structure.

2.6 FINISH

- A. For insulated and uninsulated 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 finishes for steel face sheets as follows. 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 Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 3 mm (0.5 mil).

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 the longest obtainable lengths, with end laps occurring only at structural members.
 3. Seal side and end laps with joint sealing material.
 4. Flash and seal walls at the base, at the top, around windows, door frames, framed louvers, 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 closures and 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 valleys or crowns as recommended by the manufacturer of the panel being used.
3. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay.
4. Drive exposed penetrating type fasteners normal to the surface, and to a uniform depth to seat gasketed washers properly, and drive so as not to damage factory applied coating.
5. Exercise care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Do not torque fasteners to exceed values recommended by the manufacturer.
6. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.
7. Remove metal shavings and filings from roofs on completion to prevent rusting and discoloration of the panels.

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.
- B. Paint aluminum in contact with, or built into mortar, concrete, plaster, or other masonry materials with a coat of alkali-resistant bituminous paint.
- C. Paint aluminum in contact with wood or other absorptive materials that may become repeatedly wet, with two coats of bituminous paint, or two coats of aluminum paint. Seal joints with caulking material.

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.

- - - E N D - - -

SECTION 07 54 19
POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyvinyl chloride (PVC) sheet roofing mechanically fastened to insulated roof deck.

1.2 RELATED REQUIREMENTS

- A. Non-Flooring Adhesives and Sealants VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Substrate Board, Vapor Retarder, Roof Insulation, and Cover Board: Section 07 22 00, ROOF AND DECK INSULATION.
- C. Roof Membrane Color: White.

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. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. ASTM International (ASTM):
 1. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
 2. C140/C140M-15 - Sampling and Testing Concrete Masonry Units and Related Units.
 3. C578-15b - Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 4. C936/C936M-15 - Solid Concrete Interlocking Paving Units.
 5. C1371-15 - Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

6. C1549-09(2014) - Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
7. D751-06(2011) - Test Methods for Coated Fabrics.
8. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
9. D4434/D4434M-12 - Poly (Vinyl Chloride) Sheet Roofing.
10. E96/E96M-15 - Water Vapor Transmission of Materials.
11. E408-13 - Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
12. E1918-06(2015) - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
13. E1980-11 - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
- F. Cool Roof Rating Council (CRRC):
 1. 1-15 - Product Rating Program.
- G. Florida Department of Business and Professional Regulation (FL):
 1. Approved - Product Approval.
- H. National Roofing Contractors Association (NRCA):
 1. Manual-15 - The NRCA Roofing Manual: Membrane Roofing Systems.
- I. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog.
- J. UL LLC (UL):
 1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.
 2. 1897-15 - Uplift Tests for Roof Covering Systems.
- K. 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.
- L. U.S. Environmental Protection Agency (EPA):

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at the Project site minimum 30 days before beginning Work of this section.
 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.

- d. Other installers responsible for adjacent and intersecting work, including roof deck, flashings, roof specialties, roof accessories, utility penetrations, rooftop curbs and equipment, lightning protection.
2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
 - j. Pull out test of fasteners.
 - k. Material storage, including roof deck load limitations.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 1. Roofing membrane layout.
 2. Roofing membrane fastener pattern and spacing.
 3. Roofing membrane seaming and joint details.
 4. Roof membrane penetration details.
 5. 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.
 5. Product Data for Federally-Mandated Bio-Based Materials: For roof materials, indicating USDA designation and compliance with

definitions for bio-based products, Rapidly Renewable Materials, and certified sustainable wood content.

D. Sustainable Construction Submittals:

1. Solar Reflectance Index (SRI) for roofing membrane.
2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
3. Energy Star label for roofing membrane.

E. Samples:

1. Roofing Membrane: 150 mm (6 inch) square.
2. Base Flashing: 150 mm (6 inch) square.
3. Fasteners: Each type.
4. Roofing Membrane Seam: 300 mm (12 inches) square.

F. Certificates: Certify products comply with specifications.

1. Fire and windstorm classification.
2. Energy performance requirements.

G. Qualifications: Substantiate qualifications comply with specifications.

1. Installer, including supervisors with project experience list.
2. Manufacturer's field representative with project experience list.

H. Field quality control reports.

I. Temporary protection plan. Include list of proposed temporary materials.

J. Operation and Maintenance Data:

1. Maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

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

B. Manufacturer's Field Representative:

1. Manufacturer's full-time technical employee or independent roofing inspector.

2. Individual certified by Roof Consultants Institute as Registered Roof Observer.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, 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: Mechanically fastened roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards /vapor retarders copings and edge metal.

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. ASTM E1980; Minimum 78 Solar Reflectance Index (SRI).
 - b. CRRC-1; Minimum 0.70 initial solar reflectance and minimum 0.75 emissivity.
 - c. Three-Year Aged Performance: Minimum 0.55 solar reflectance tested in according to ASTM C1549 or ASTM E1918, and minimum 0.75 thermal emittance tested in according to ASTM C1371 or ASTM E408.
 - 1) Where tested aged values are not available:
 - a) Calculate compliance adjusting initial solar reflectance according to ASHRAE 90.1.
 - b) Provide roofing system with minimum 64 three-year aged Solar Reflectance Index calculated according to ASTM E1980 with 12 W/sq. m/degree K (2.1 BTU/h/sq. ft.) convection coefficient.

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide roof system components from one manufacturer.
- C. Sustainable Construction Requirements:
 - 1. Bio-Based Materials: Where applicable, provide products designated by USDA and meeting or exceeding USDA recommendations for bio-based content, and products meeting Rapidly Renewable Materials and certified sustainable wood content definitions; refer to www.biopreferred.gov.
 - 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.

2.4 PVC ROOFING MEMBRANE

- A. PVC Sheet: ASTM D4434/D4434M, Type II - reinforced.
 - 1. Backing: Without fabric backing .
 - 2. Thickness: 1.5 mm (60 mils).

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

3.2 PREPARATION

- A. Complete roof deck construction before beginning roofing work:
 - 1. 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, except Insulating Concrete:
 - 1. Test concrete decks for moisture according to ASTM D4263 before installing roofing materials.
 - 2. Prime concrete decks. Keep primer back 100 mm (four inches) from precast concrete deck joints.
 - 3. Allow primer to dry before application of bitumen.
- F. Insulating Concrete Decks:
 - 1. Allow deck to dry out minimum five days after installation before installing roofing materials.
 - 2. Allow additional drying time when precipitation occurs before installing roofing materials.

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 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 or solvent 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 fascia-cants, 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.
- G. Mechanically Fastened System Installation:
1. Secure roofing membrane to structural deck with fasteners through battens to achieve specified wind uplift performance.
 - a. Drill pilot holes for fasteners installed into cast-in-place concrete. Drill hole minimum 10 mm (3/8 inch) deeper than fastener penetration.
 2. When fasteners are installed within membrane laps, locate battens minimum 13 mm (1/2 inch) from edge of sheets.
 3. Where fasteners are installed over roofing membrane after seams are welded, cover fasteners with minimum 175 mm (7 inch) diameter PVC membrane cap centered over fasteners. Where battens are used cover batten with minimum 175 mm (7 inch) wide PVC strip centered over batten. Weld cap to roofing membrane and finish edges with lap sealant.

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. 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.

C. Repairs to Membrane and Flashings:

1. Remove sections of roofing membrane and flashing sheets that are creased, wrinkled, or fishmouthed.
2. Cover removed areas, cuts and damaged areas with patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Weld patch to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

3.7 FLEXIBLE WALKWAYS (NOT USED)

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 combination of fastener type and roof deck type before installing roof insulation.
 - a. Test at locations selected by Contracting Officer's Representative.
 - b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.
 - c. Test Results:
 - 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 and Manufacturer's field representative.
3. Probe seams to detect marginal welds, voids, skips, and fishmouths.

4. Cut 100 mm (4 inch) wide by 300 mm (12 inch) long samples through seams where directed by Contracting Officer's Representative.
5. Cut one sample for every 450 m (1500 feet) of seams.
6. Cut samples perpendicular to seams.
7. Failure of samples to pass ASTM D751 test will be cause for rejection of work.
8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
9. Repair fishmouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.

B. Manufacturer Services:

1. Inspect initial installation, installation in progress, and completed work.
2. Issue supplemental installation instructions necessitated by field conditions.
3. Prepare and submit inspection reports.
4. Certify completed installation complies with manufacturer's instructions and warranty requirements.

3.10 CLEANING

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

3.11 PROTECTION

- A. Protect roofing system from 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 when directed by Contracting Officer's Representative.
- 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, drainage specialties, and formed expansion joint covers are specified in this section.

1.2 RELATED WORK

- A. Section 07 54 19 POLYVINYL-CHLORIDE (PVC) ROOFING Membrane base flashings and stripping.
- B. Section 07 71 00 ROOF SPECIALTIES: Manufactured flashing, copings, roof edge metal, fasciae and accessories.
- C. Section 07 25 00, WEATHER BARRIERS: Integral flashing components.
- D. Division 07 40 00 SIDING PANELS: Flashing components of factory finished siding systems.
- E. Section 07 92 00, JOINT SEALANTS: Joint Sealants.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. Aluminum Association (AA):

AA-C22A41 Aluminum Chemically etched medium matte, with
clear anodic coating, Class I Architectural,
0.7-mil thick

AA-C22A42 Chemically etched medium matte, with integrally
colored anodic coating, Class I Architectural,
0.7 mils thick

AA-C22A44 Chemically etched medium matte with
electrolytically deposited metallic compound,
integrally colored coating Class I
Architectural, 0.7-mil thick finish

C. American National Standards Institute/Single-Ply Roofing

Institute/Factory Mutual (ANSI/SPRI/FM):

4435/ES-1-11 Wind Design Standard for Edge Systems Used with
Low Slope Roofing Systems

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-CSI-241
1-22-2025
Bid Documents

D.American Architectural Manufacturers Association (AAMA):

AAMA 620-02 Voluntary Specification for High Performance
Organic Coatings on Coil Coated Architectural
Aluminum

AAMA 621-02 Voluntary Specification for High Performance
Organic Coatings on Coil Coated Architectural
Hot Dipped Galvanized (HDG) and Zinc-Aluminum
Coated Steel Substrates

E.ASTM International (ASTM):

A240/A240M-20 Standard Specification for Chromium and
Chromium-Nickel Stainless Steel Plate, Sheet
and Strip for Pressure Vessels and for General
Applications.

A653/A653M-20 Steel Sheet Zinc-Coated (Galvanized) or Zinc
Alloy Coated (Galvanized) by the Hot- Dip
Process

B32-08(2014) Solder Metal

B209-14 Aluminum and Aluminum-Alloy Sheet and Plate

B370-12(2019) Copper Sheet and Strip for Building
Construction

D173/D173M-03(2018) Bitumen-Saturated Cotton Fabrics Used in
Roofing and Waterproofing

D412-16 Vulcanized Rubber and Thermoplastic Elastomers-
Tension

D1187/D1187M-97(2018) ..Asphalt Base Emulsions for Use as Protective
Coatings for Metal

D1784-20 Rigid Poly (Vinyl Chloride) (PVC) Compounds and
Chlorinated Poly (Vinyl Chloride) (CPVC)
Compounds

D3656/D3656M-13 Insect Screening and Louver Cloth Woven from
Vinyl-Coated Glass Yarns

D4586/D4586M-07(2018) ..Asphalt Roof Cement, Asbestos Free

F.Sheet Metal and Air Conditioning Contractors National Association
(SMACNA): Architectural Sheet Metal Manual.

G.National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06 Metal Finishes Manual

Federal Specification (Fed. Spec):

A-A-1925A Shield, Expansion; (Nail Anchors)

UU-B-790A Building Paper, Vegetable Fiber

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

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:

1. Wind Zone 2: 1.48 to 2.15 kPa (31 to 45 pound force/square foot):
4.31-kPa (90 pound force/square foot) perimeter uplift force, 5.74-
kPa (120 pound force/square foot) corner uplift force, and 2.15-kPa
(45 pound force/square foot) outward force.

B. Wind Design Standard: Fabricate and install copings, roof-edge
flashings, tested per ANSI/SPRI/FM 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. Expansion joints
4. Fascia-cant

C. Manufacturer's Literature and Data: For all specified items,
including:

1. Two-piece counterflashing
2. Expansion joint cover, each type
3. Nonreinforced, elastomeric sheeting
4. Fascia-cant
5. Manufactures color chart with each type and color of finish
indicated.

D. Certificates: Indicating compliance with specified finishing
requirements, from applicator and contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. 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.

B. Galvanized Sheet: ASTM, A653.

C. Nonreinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheeting shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

A. Fasteners:

1. Use stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.

2. Nails:

a. Minimum diameter for aluminum nails 3 mm (0.105 inch).

b. 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.

B. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

C. Insect Screening: ASTM D3656, 18 by 18 regular mesh.

D. 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. Galvanized steel: 0.5 mm (0.021 inch) thick.

C. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:

1. 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.
2. Flat and lap joints shall be made in direction of flow.
 3. Edges of bituminous coated copper, copper covered paper, nonreinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 100 mm (4 inches) in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.

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 1.25 mm (0.050 inch) thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).

6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 1.6 mm (0.0625 inch) thick aluminum.

D. Drips:

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

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. Color shall match color of siding panels in Section 07 40 00.
- C. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- D. Finish exposed metal surfaces as follows, unless specified otherwise:
 1. Aluminum, Steel, and Galvanized Steel:
 - a. Colored Finish: Backed on, factory applied fluoropolymer color coating or siliconized polyester coating. Dry film thickness of coatings must be 0.022 to 0.033 mm (0.8 to 1.3 mils). Color to

match color of Section 07 40 00 Siding Panels, or as selected from Manufacturers full range of color choices. Field application of color coatings are prohibited and will be rejected.

2.6 THROUGH-WALL FLASHINGS (NOT USED)

2.7 BASE FLASHING

- A. Use metal base flashing at vertical surfaces where shown.
 - 1. Use Galvanized Steel, thickness specified unless specified otherwise.
 - 2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use Galvanized Steel (0.018 inch).
- B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).
- C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.
- D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.
- E. Pipe Flashing: (Other than engine exhaust or flue stack)
 - 1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
 - 2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
 - 3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
 - a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
 - b. Allow for loose fit around and into the pipe.
 - 4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
 - a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
 - b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING (CAP FLASHING OR HOODS) (NOT USED)

2.9 GRAVEL STOPS (NOT USED)

2.10 BITUMEN STOPS (NOT USED)

2.11 HANGING GUTTERS (NOT SUEDE)

2.12 CONDUCTORS (DOWNSPOUTS) (NOT USED)

2.13 SPLASHPANS (NOT USED)

2.14 REGLETS (NOT USED)

2.15 INSULATED EXPANSION JOINT COVERS (NOT USED)

2.16 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING (NOT USED)

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. 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.
6. 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.
7. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.

8. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
9. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
10. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
11. 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.
12. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
13. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 THROUGH-WALL FLASHING (NOT USED)

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) (NOT USED)

3.5 REGLETS (NOT USED)

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 (NOT USED)

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 copings, gravel stops, fascias, and expansion joints.

1.2 RELATED WORK

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

1.3 QUALITY CONTROL

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

1.4 PERFORMANCE REQUIREMENTS

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

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

1.5 SUBMITTALS

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

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):

A240/A240M-20	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A653/A653M-20	Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
A666-15	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

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-COI-241
1-22-2025
Bid Documents

- B221M-13 Aluminum-Alloy Extruded Bars, Rods, Wire,
Shapes, and Tubes (Metric)
- B32-08(2014) Solder Metal
- B370-12(2019) Copper Sheet and Strip for Building
Construction
- B882-10(2018) Pre-Patinated Copper for Architectural
Applications
- C612-14(2019) Mineral Fiber Block and Board Thermal
Insulation
- D1187/D1187M-97(2018) ..Asphalt-Base Emulsions for Use as Protective
Coatings for Metal
- D1970/D1970M-20 Self-Adhering Polymer Modified Bituminous Sheet
Materials Used as Steep Roofing Underlayment
for Ice Dam Protection
- D226/D226M-17 Asphalt-Saturated Organic Felt Used in Roofing
and Waterproofing
- D4869/D4969M-16a Asphalt-Saturated Organic Felt Underlayment
Used In Steep Slope Roofing
- C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06 Metal Finishes Manual
- D. American Architectural Manufacturers Association (AAMA):
2605-11 High Performance Organic Coatings on
Architectural Extrusions and Panels.
611-14 Anodized Architectural Aluminum
- E. FM Global (FM):
RoofNav Approved Roofing Assemblies and Products

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum, Extruded: ASTM B221M (B221).
- B. Aluminum Sheet: ASTM B209M (B209).
- C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.
- D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- E. Recycled Content of Metal Products: Postconsumer recycled content plus
one-half of preconsumer recycled content not less than 30 percent.
- F. Insulation: ASTM C612, Class 1 or 2.
- G. 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.

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 as selected by Architect from manufacturer's standard color line.

2.5 EXTRUDED ALUMINUM GRAVEL STOPS AND FASCIAS

- A. Fabricate of aluminum not less than 2 mm (0.078 inch) thick.
- B. Turn fascia down face of wall and up above roof as shown in construction documents.
- C. Maximum lengths of 3.05 M (10-feet).
- D. Shop fabricate external and internal corners as one (1)-piece assemblies with not less than 305 mm (12 inch) leg lengths.

- E. Provide 101 mm (4 inch) wide 2 mm (0.078 inch) thick watertight joint covers with 152 mm (6 inch) wide 0.8 mm (0.030 inch) thick underside joint flashing.
- F. Finish: Two-coat fluoropolymer. Color as selectd by Architect from manufactures standard color line.

2.6 EXTRUDED ALUMINUM FASCIA-CANT SYSTEM

- A. The fascia-cant system consists of three (3) pieces, an extruded aluminum fascia, a galvanized steel cant, and an aluminum compression clamp.
- B. Furnish in stock lengths of not more than 3.05 M (10 feet) long.
- C. Form fascia from not less than 2 mm (0.070 inch) thick aluminum. Provide 101 mm (4 inch) wide 0.81 mm (0.032-inch) thick concealed sheet aluminum joint cover plates in back of fascia.
- D. Form cant strip from galvanized steel not less than 0.75 mm (0.0299 inch) thick, to profile shown and design to hold lower edge of the fascia.
- E. Form compression clamp of not less than 0.81 mm (0.032 inch) thick aluminum designed to hold the top edge of the fascia and the built-up flashing.
- F. Internal and external corners:
 - 1. Factory fabricate and fully weld mitered joints.
 - 2. Furnish corner sections in manufacturers standard sizes with not less than 305 mm (12 inch) leg lengths.
- G. Factory fabricated fascia sump assemblies.
 - 1. Fabricate sump assemblies with stainless steel cores and extruded aluminum cover to match fascia-cant.
 - 2. Furnish sump assembly in 508 mm (20 inch) minimum lengths.
- H. Factory fabricated scupper assemblies:
 - 1. Fabricate scupper assembly with extended plates to match fascia-cant in 508 mm (20 inch) minimum lengths.
 - 2. Extend outlet opening not less than 50 mm (2 inches) with drip edge.
 - 3. Fabricate with stainless steel core or sleeve to drain water from toe of cant and flash in to built-up roofing with 101 mm (4 inch) wide flange.
- I. Finish on aluminum: Two-coat fluoropolymer. Color as selectd by Architect from manufactures standard color line..

2.7 EXTRUDED ALUMINUM ROOF EXPANSION JOINT COVERS

- A. Fabricate in 3.0 M (10 foot) lengths with fastener openings slotting for expansion not over 610 mm (24 inch) centers.
- B. Provide four-way expansion, for joint widths shown on construction documents.
- C. Mill finish.
- D. Form waterstop or moisture seals of continuous sheets of neoprene, not less than 0.81 mm (0.032 inch) thick.
- E. Fabricate corners as one (1) piece assembly with mitered and welded joint and least dimension legs not less than 300 mm (12 inches) long.
- F. Factory fabricate end caps and transitions to insure waterproof assembly.
- G. Five (5) piece assembly:
 - 1. Roof expansion joint cover system consists of an extruded aluminum cover, extruded frame or curb vertical section, galvanized steel cant, and aluminum compression clamp counter flashing, complete with moisture seals. Form cover and vertical section from extruded aluminum, 2 mm (0.080 inch) minimum thickness with spring stainless steel tension or pivot bar.
 - 2. Form cant from galvanized steel not less than 0.8 mm (0.029 inch) thick formed to profile shown on construction documents.
 - 3. Form splice plates of not less than 0.81 mm (0.032 inch) thick aluminum sheet.
 - 4. Form counter flashing member of 1.3 mm (0.050 inch) thick sheet aluminum, secured with screws to the top edge of the vertical section and providing compression clamp over base flashing.
 - 5. Provide compression gasket separating cover from curb bearing.
- H. Two (2) piece assembly:
 - 1. Roof expansion joint system consists of an extruded aluminum cover combination extruded aluminum frame or curb with integral adjustable counter flashing flange, and moisture seals.
 - 2. Form cover from extruded aluminum 2 mm (0.078 inch) minimum thickness.
 - 3. Form cover anchor system of stainless steel pivot bar.
 - 4. Form frame assembly of not less than 2 mm (0.076 inch) aluminum except for flashing portion.
 - 5. Provide compression gasket separating cover from curb at bearing.

2.8 FINISH:

- A. In accordance with NAAMM AMP 500-505.
- B. Aluminum, Mill Finish: AA-MIX, as fabricated.
- C. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, areas, and conditions, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- C. Underlayment Installation:
 - 1. Self-Adhering Sheet Underlayment:
 - a. Apply primer as required by manufacturer.
 - b. Comply with temperature restrictions of underlayment manufacturer for installation.
 - c. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 152 mm (6 inches) staggered 610 mm (24 inches) between courses.
 - d. Overlap side edges not less than 89 mm (3-1/2 inches). Roll laps with roller.
 - e. Cover underlayment within 14 days.
 - f. Apply continuously under copings and roof-edge fascias and gravel stops.
 - g. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.
- 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. Gravel Stops and Fascias:
 - 1. Install gravel stops and fascia with butt joints with approximately 6 mm (1/4 inch) space for expansion.
 - 2. Over each joint provide cover plates of sheet aluminum, complete with concealed sheet aluminum flashing, centered under each joint.
 - 3. Provide lap cover plates and concealed flashing over the gravel stop and fascia not less than 101 mm (4 inches).
 - 4. Extend concealed flashing over built-up roofing, embed in roof cement and turn down over face of blocking at roof edge.
- 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. Fascia-Cant System:
 - 1. Install galvanized steel cant; coordinate with roofing work and after completion of roofing work install extruded aluminum fascia, concealed joint cover plate, and aluminum compression clamp, where shown in construction documents.
 - 2. Install system to allow for expansion and contraction with 6 mm (1/4 inch) space between extruded aluminum members and galvanized steel cant as required by manufacturer of system.
 - 3. Offset joints in extruded aluminum members from galvanized steel cant joints.
- L. Expansion Joint Covers:
 - 1. Install to terminate base flashing 203 mm (8 inches) above roof.
 - 2. Install moisture seals to drain water to outlets that do not permit water to enter building.
 - 3. Provide stainless steel screws when exposed.
 - 4. Three piece assembly:

- a. Install curb section with screws to wood blocking, allowing 6 mm (1/4 inch) at butt joints between sections with splice plate at joint.
 - b. Install cant to wood blocking by nailing along horizontal flange every 152 mm (6 inches), with galvanized roofing nails 25 mm (1 inch) long.
 - c. After completion of base flashing install cap flashing and compression clamp and fasten to the curb or metal cant with stainless steel self-tapping screws with neoprene washers under head spaced approximately 457 mm (18 inches) on center.
 - d. Install expansion joint cover with a 6 mm (1/4 inch) wide end joints.
 - e. Install over end joint a cover plate complete with concealed aluminum flashing, centered under each joint. Fabricate flashing to lap cover not less than 101 mm (4 inches).
5. Two piece assembly:
- a. Install curb section with screws allowing 6 mm (1/4 inch) space at end joints with splice plate at joint.
 - b. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
 - c. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 610 mm (24 inches) on center.
 - d. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 101 mm (4 inches).

3.2 PROTECTION OF ALUMINUM

- A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one (1) side.
- B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two (2) coats of asphalt coating.

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Perform Site Prep for SPS Equipment
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1-22-2025
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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.

- - - E N D - - -

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. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES: Expansion and seismic joint firestopping.
- C. Section 07 81 00, APPLIED FIREPROOFING: Spray applied fireproofing.
- D. Section 07 92 00, JOINT SEALANTS: Sealants and application.
- E. Section 23 31 00, HVAC DUCTS AND CASINGS: Fire and smoke damper assemblies in ductwork.
- F. Section 23 37 00, AIR OUTLETS AND INLETS: Fire and smoke damper assemblies in ductwork.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in
PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Inspector qualifications.
- E. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- F. List of FM, UL, or WH classification number of systems installed.
- G. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.
- H. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

1.4 DELIVERY AND STORAGE

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

1.5 QUALITY ASSURANCE

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.
- B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.
- C. Inspector Qualifications: Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - E84-20 Surface Burning Characteristics of Building Materials
 - E699-16 Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components
 - E814-13a(2017) Fire Tests of Penetration Firestop Systems
 - E2174-20a Standard Practice for On-Site Inspection of Installed Firestop Systems
 - E2393-20 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

E. Annual Issue Fire Resistance Directory

723-Edition 11(2018) ...Standard for Test for Surface Burning

Characteristics of Building Materials

1479-04(2015) Fire Tests of Penetration Firestops

F. Intertek Testing Services - Warnock Hersey (ITS-WH):

Annual Issue Certification Listings

G. Environmental Protection Agency (EPA):

40 CFR 59(2014) National Volatile Organic Compound Emission

Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS

- A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 inches) nominal pipe or 0.01 square meter (16 square inches) in overall cross sectional area.
- C. Firestop sealants used for firestopping or smoke sealing to have the following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Release no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:
 1. Classified for use with the particular type of penetrating material used.
 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.
- F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- G. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.
- H. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 101 mm (4 inches) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS

- A. Provide silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Provide mineral fiber filler and bond breaker behind sealant.
- C. Sealants to have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with ASTM E84.
- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Submit product data and installation instructions, as required by article, submittals, after an on-site examination of areas to receive firestopping.
- B. Examine substrates and conditions with installer present for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.
- C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from

firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION

- A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.
- C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Clean up spills of liquid type materials.
- C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK

- A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).
- B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and type of firestopping used at each location; type is to be recorded by UL listed printed numbers.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Sealing of Site Work Concrete Paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- C. Metal Pannel: Section 07 40 00, SIDING PANELS
- D. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.
- G. Sound Rated Gypsum Partitions/Sound Sealants: Section 09 29 00, GYPSUM BOARD.
- H. Mechanical Work: Section 22 05 11 COMMON WORK RESULTS FOR PLUMBING
Section 23 05 10 Common Work Results for Boiler Plant and Steam
Generation Section 23 05 11, COMMON WORK RESULTS FOR 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 elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by

reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.

4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Lab Tests: Submit samples of materials that will be in contact or affect joint sealants to joint sealant manufacturers for tests as follows:

1. Adhesion Testing: Before installing elastomeric sealants, test their adhesion to protect joint substrates according to the method in ASTM C794 to determine if primer or other specific joint preparation techniques are required.
2. Compatibility Testing: Before installing elastomeric sealants, determine compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Perform testing per ASTM C1248 on interior and exterior sealants to determine if sealants or primers will stain adjacent surfaces. No sealant work is to start until results of these tests have been submitted to the Contracting Officer Representative (COR) and the COR has given written approval to proceed with the work.

1.4 CERTIFICATION:

- A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.

G. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

H. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
 - b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.8 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Backing Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.9 WARRANTY:

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

- B. Manufacturer Warranty: Manufacturer must warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 APPLICABLE PUBLICATIONS:

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

- B. ASTM International (ASTM):

C509-06 Elastomeric Cellular Preformed Gasket and
Sealing Material
C612-14 Mineral Fiber Block and Board Thermal
Insulation
C717-14a Standard Terminology of Building Seals and
Sealants
C734-06(R2012) Test Method for Low-Temperature Flexibility of
Latex Sealants after Artificial Weathering
C794-10 Test Method for Adhesion-in-Peel of Elastomeric
Joint Sealants
C919-12. Use of Sealants in Acoustical Applications.
C920-14a Elastomeric Joint Sealants.
C1021-08(R2014) Laboratories Engaged in Testing of Building
Sealants
C1193-13 Standard Guide for Use of Joint Sealants.
C1248-08(R2012) Test Method for Staining of Porous Substrate by
Joint Sealants
C1330-02(R2013) Cylindrical Sealant Backing for Use with Cold
Liquid Applied Sealants
C1521-13 Standard Practice for Evaluating Adhesion of
Installed Weatherproofing Sealant Joints
D217-10 Test Methods for Cone Penetration of
Lubricating Grease
D1056-14 Specification for Flexible Cellular Materials—
Sponge or Expanded Rubber
E84-09 Surface Burning Characteristics of Building
Materials

- C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

D. Environmental Protection Agency (EPA):

40 CFR 59(2014) National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
2. Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
 - a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
 - b. Metal to metal.
 - c. Masonry to masonry or stone.
 - d. Stone to stone.
 - e. Cast stone to cast stone.
 - f. Masonry expansion and control joints.
 - g. Wood to masonry.
 - h. Masonry joints where shelf angles occur.
 - i. Voids where items penetrate exterior walls.
 - j. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

B. Floor Joint Sealant:

1. ASTM C920, Type S or M, Grade P, Class 25, Use T.
2. Provide location(s) of floor joint sealant as follows.
 - a. Seats of metal thresholds exterior doors.
 - b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

C. Interior Sealants:

1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Architectural Sealants: 250 g/L.

- b. Sealant Primers for Nonporous Substrates: 250 g/L.
- c. Sealant Primers for Porous Substrates: 775 g/L.
- 2. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
- 4. Provide location(s) of interior sealant as follows:
 - a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
 - b. Perimeter of doors, windows, access 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 lead faced control windows and plaster or gypsum wallboard walls.
 - f. Exposed isolation joints at top of full height walls.
 - g. Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; 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 of 25 or less; and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Acoustical sealant have a consistency of 250 to 310 when tested in accordance with ASTM D217; remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C734; and be non-staining.
 - 2. Provide location(s) of acoustical sealant as follows:
 - a. Exposed acoustical joint at sound rated partitions.
 - b. Concealed acoustic joints at sound rated partitions.
 - c. Joints where item pass-through sound rated partitions.

2.2 COLOR:

- A. Sealants used with exposed masonry are to match color of mortar joints.

- B. Sealants used with unpainted concrete are to match color of adjacent concrete.
- C. Color of sealants for other locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 WEEPS: (NOT USED)

2.5 FILLER:

- A. Mineral fiberboard: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.7 CLEANERS-NON POROUS SURFACES:

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or

harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.

- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
 - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 - 2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

- A. General:
 - 1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).

2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
 3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 5. Avoid dropping or smearing compound on adjacent surfaces.
 6. Fill joints solidly with compound and finish compound smooth.
 7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
 8. Finish paving or floor joints flush unless joint is otherwise detailed.
 9. Apply compounds with nozzle size to fit joint width.
 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
 11. Replace sealant which is damaged during construction process.
- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.
- C. 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.

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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. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

3.7 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow metal doors hung in hollow metal frames at interior and exterior locations.
2. Hollow metal door frames for wood doors at interior locations.
3. Glazed openings in hollow metal doors.

1.2 RELATED WORK

- A. Section 05 50 00, METAL FABRICATIONS: Frames fabricated of structural steel.
- B. Section 07 40 00, SIDING PANELS; Flashing at siding panels.
- C. Section 08 71 00, DOOR HARDWARE: Door Hardware:
- D. Section 07 92 00, JOINT SEALANTS
- E. Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- F. Section 09 29 00, GYPSUM BOARD
- G. Card Readers and Biometric Devices: Section 28 13 00, PHYSICAL ACCESS

CONTROL SYSTEM.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standard Institute (ANSI):
A250.8-2014 Standard Steel Doors and Frames
- C. ASTM International (ASTM):
A240/A240M-15b Chromium and Chromium-Nickel Stainless Steel
Plate, Sheet, and Strip for Pressure Vessels
and for General Applications
A653/A653M-15 Steel Sheet, Zinc-Coated (Galvanized) or
Zinc-Iron Alloy-Coated (Galvannealed) by the
Hot-Dip
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
B209-14 Aluminum and Aluminum-Alloy Sheet and Plate
B209M-14 Aluminum and Aluminum-Alloy Sheet and Plate
(Metric)

- B221-14 Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Profiles, and Tubes
- B221M-13 Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Profiles, and Tubes (Metric)
- D3656/D3656M-13 Insect Screening and Louver Cloth Woven from
Vinyl Coated Glass Yarns
- E90-09 Laboratory Measurement of Airborne Sound
Transmission Loss of Building Partitions and
Elements
- D. Federal Specifications (Fed. Spec.):
- L-S-125B Screening, Insect, Nonmetallic
- E. Master Painters Institute (MPI):
- No. 18 Primer, Zinc Rich, Organic
- F. National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500-06 Metal Finishes Manual
- G. National Fire Protection Association (NFPA):
- 80-16 Fire Doors and Other Opening Protectives
- H. UL LLC (UL):
- 10C-09 Positive Pressure Fire Tests of Door Assemblies
- 1784-15 Air Leakage Tests of Door Assemblies and Other
Opening Protectives
- I. Department of Veterans Affairs
- VA Physical Security and Resiliency Design Manual October 1, 2020

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 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. Test reports: Certify products comply with specifications.
 - 1. Sound rated door.
- F. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer.

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.

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 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 SYSTEM PERFORMANCE

- A. Design hollow metal doors and frames complying with specified performance:
 - 1. Fire Doors and Frames: UL 10C; NFPA 80 labeled.
 - a. Fire Ratings: See drawings.
 - 2. Stair Doors: Temperature rise rated fire doors.
 - 3. Smoke Control Doors and Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cubic meter/second/square meter (3.0 cubic feet/minute/square foot) at 24.9 Pa (0.10 inches water gauge) pressure differential.

4. Sound Rated Doors and Frames: Minimum 35 sound transmission class (STC) when tested according to ASTM E90.
5. Thermal Resistance: 12 R-value at exterior doors.

2.2 MATERIALS

- A. Stainless Steel: ASTM A240/A240M; Type 304.
- B. Sheet Steel: ASTM A1008/A1008M, cold-rolled.
- C. Galvanized Sheet Steel: ASTM A653.
- D. Insect Screening: ASTM D3656/D3656M, 18 by 18 aluminum wire mesh.
- E. Aluminum Sheet: ASTM B209M (ASTM B209).
- F. Aluminum Extrusions: ASTM B221M (ASTM B221).

2.3 PRODUCTS - GENERAL

- A. Provide hollow metal doors and frames from one manufacturer.
- B. 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 sizes and designs.
 1. Interior Doors: Level 2 and Physical Performance Level B, heavy duty; Model 2.
 2. Exterior Doors: Level 3 and Physical Performance Level A, extra-heavy duty; Model 2.
- B. Door Faces:
 1. Interior Doors: Sheet steel minimum Z120 or ZF120 (G40 or A40) coating.
 2. Exterior Doors: Galvanized sheet steel minimum Z180 or ZF180 (G60 or A60) coating.
- C. Door Cores:
 1. Interior Doors: vertical steel stiffeners.
 2. Exterior Doors: Polystyrene.
 3. Fire Doors: Manufacturer's standard complying with specified fire rating performance.

2.5 HOLLOW METAL FRAMES

- A. Hollow Metal Frames: ANSI A250.8; face welded. See drawings for sizes and designs.
 1. Interior Frames:
 - a. Level 1 Hollow Metal Doors: 1.0 mm (0.042 inch) thick.

- b. Level 2 Hollow Metal Doors: 1.3 mm (0.053 inch) thick.
- c. Level 1 Hollow Metal Doors: 1.0 mm (0.042 inch) thick.
- d. Wood Doors: 1.0 mm (0.042 inch) thick.
- 2. Interior Borrowed Light Frames: 1.3 mm (0.051 inch) thick.
- B. Frame Materials:
 - 1. Interior Frames: 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. Fire and Smoke Control Doors:
 - 1. Close top and vertical edges flush.
 - 2. Apply steel astragal to active leaf at pair and double egress doors.
 - a. Exception: Where vertical rod exit devices are specified for both leaves swinging in same direction.
 - 3. Fire and Smoke Control Door Clearances: NFPA 80.
- D. Custom Metal Hollow Doors:
 - 1. Provide custom hollow metal doors where nonstandard steel doors are shown on drawings.
 - a. Provide door sizes, design, materials, construction, gauges, and finish as specified for standard steel doors.
- E. Sound Rated Doors:
 - 1. Seals: Integral spring type automatic door bottom seal.
 - 2. Fabricate vision panel cutouts and frames to receive double glazing as shown on drawings.
 - 3. All doors are to be sound rated.
 - 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 50 mm by 50 mm by 9 mm (2 inch by 2 inch by 3/8 inch) clip angle for lead lined frames, drilled for floor fasteners.
 - 4) Provide mullion 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two floor fasteners and frame anchor screws.
 - 5) 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 bolts 50 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.
- c) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.
- 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.

F. Sound Rated Door Frames:

- 1. Seals: Integral continuous gaskets on frames.

2.8 FINISHES

- A. Steel and Galvanized Steel: ANSI A250.8; shop primed.
- 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.
 - 1. Metal Framing: Steel drill screws.
 - 2. Masonry and Concrete: Expansion bolts and power actuated drive pins.
- F. Anchors: Galvanized 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 doors and frames according to NFPA 80.
 - 3. Install smoke control doors and 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. Lead Lined Frames: Use 9 mm (3/8 inch) diameter bolts.
 - b. Other Frames: 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 Masonry and Concrete 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.
- c. Secure two-piece frames to subframe or rough buck with machine screws on both faces.

E. Frames for Sound Rated Doors: Fill frames with insulation.

3.4 DOOR INSTALLATION

- A. Install doors plumb and level.
- B. Adjust doors for smooth operation.
- C. Touch up damaged factory finishes.
 - 1. Repair galvanized surfaces with galvanized repair paint.
 - 2. Repair painted surfaces with touch up primer.

3.5 CLEANING

- A. Clean exposed door and frame surfaces. Remove contaminants and stains.

3.6 PROTECTION

- A. Protect doors and frames from construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

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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 WORK

- A. Section 08 71 00, DOOR HARDWARE: Lock Cylinders.
- B. Section 09 91 00, PAINTING: Field Painting.
- C. Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS: Access Doors for Control or Drain Valves.
- D. Section 21 12 16, DRY-PIPE SPRINKLER SYSTEMS: Access Doors for Control or Drain Valves.
- E. Section 22 40 00, PLUMBING FIXTURES: Access Doors for Plumbing Valves.
- F. Section 23 31 00, HVAC DUCTS AND CASINGS: Locations of Access Doors for Ductwork Cleanouts.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Welding Society (AWS):
D1.3/D1.3M-2018 Structural Welding Code - Sheet Steel
(6th Edition.
- C. ASTM International (ASTM):
A653/A653M-20 Steel Sheet, Zinc-Coated (Galvanized) or
Zinc-Iron Alloy-Coated (Galvannealed) by the
Hot-Sip Process.
A1008/A1008M-18 Steel, Sheet, Cold-Rolled, Carbon, Structural,
High-Strength Low-Alloy, High-Strength
Low-Alloy with Improved Formability, Solution
Hardened, and Bake Hardenable.
A666-15 Annealed or Cold-Worked Austenitic Stainless
Steel sheet, Strip, Plate, and Flat Bar.
E119-20 Fire Test of Building Construction and
Materials.
- D. National Fire Protection Association (NFPA):
80-2019 Edition Fire Doors and Other Opening Protectives.
252-2017 Edition Fire Tests of Door Assemblies.
- E. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06 Metal Finishes Manual.

F. UL LLC (UL):

Listed Online Certifications Directory.

10B-08 (Edition 10) Standard for Fire Tests of Door Assemblies.

263-11 (Edition 14) 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 A653/A653M.
- C. Stainless Steel: ASTM A666; Type 302 or Type 304.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Stainless Steel.
- B. Provide each product from one manufacturer.
- C. Sustainable Construction Requirements:
 - 1. Steel Access Doors Recycled Content: 30 percent total recycled content, minimum.
 - 2. Stainless Steel Access Doors Recycled Content: 70 percent total recycled content, minimum.

2.3 ACCESS DOORS, FIRE-RATED (NOT USED)

2.4 ACCESS DOORS, FLUSH PANEL, NON-RATED

- A. Door Panel:
 - 1. 1.5 mm (0.06 inch) thick stainless steel sheet.
 - 2. Reinforce to maintain flat surface.
- B. Frame:
 - 1. 1.5 mm (0.06 inch) thick stainless steel sheet, depth and configuration to suit material and construction type where installed.
 - 2. Frame Flange: Provide at units installed in concrete, masonry, and gypsum board.
 - 3. Exposed Joints in Flange: Weld and grind smooth.
- C. Hinge:
 - 1. Concealed spring hinge, 175 degrees of opening.
 - 2. Removable hinge pin to allow removal of door panel from frame.
- D. Lock:
 - 1. Flush, screwdriver-operated cam lock.

2.5 ACCESS DOOR, RECESSED PANEL, NON-RATED (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-rated doors, provide hinges and locks as required by fire test.
- D. Anchoring: Make provisions in frame for anchoring to adjacent construction. Provide anchors in size, number and location on four sides to secure access door to substrate. Provide anchors as required by fire test.

2.7 FINISHES

- A. Stainless Steel Exposed Surfaces: NAAMM AMP 500; No.06 Metal Finishes.

2.8 ACCESSORIES

- A. Fasteners: Type and size recommended by access door manufacturer, to suit application.
1. Stainless Steel Access Doors: Stainless steel fasteners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
1. Verify access door locations and sizes provide required maintenance access to installed building services components.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical and conveyor control items concealed in walls and partitions, and concealed above gypsum board and plaster ceilings.
- C. Install fire rated access door according to NFPA 80.
- D. Install fire-rated doors in fire-rated partitions and ceilings.
- E. Install flush access panels in partitions and in gypsum board and plaster ceilings.

3.3 ACCESS DOOR AND FRAME INSTALLATION

- A. Wall Installations: Install access doors in openings with sides vertical.
- B. Ceiling Installations: Install access doors parallel to ceiling suspension grid or room partitions.
- C. Frames without Flanges: Install frame flush with surrounding finish surfaces.
- D. Frames with Flanges: Overlap opening, with face uniformly spaced from finish surface.
- E. Recessed Panel Access Doors: Install with face of surrounding materials flush with door panel installed finish.
- F. Secure frames to adjacent construction with fasteners.
- G. Install type, size and quantity of anchoring device suitable for material surrounding opening to maintain alignment, and resist displacement, during normal use of access door.
- H. Field Painting Primed Access Doors: Comply with the requirements of Section 09 91 00, PAINTING.

3.4 ADJUSTMENT

- A. Adjust hardware so door panel opens freely.
- B. Adjust door when closed so door panel is centered in frame.

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

B. Application of Hardware: Section 08 14 00, WOOD DOORS Section 08 11 13, HOLLOW METAL DOORS AND FRAMES Section 08 71 13.11, LOW ENERGY DOOR OPERATORS

C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Painting: Section 09 91 00, PAINTING.

E. Card Readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.

F. Electrical: Division 26, ELECTRICAL.

G. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 GENERAL

A. All hardware shall comply with ABAAS, (Architectural Barriers Act Accessibility Standard) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

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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.
5. Floor closers.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:

1. Locks, latchsets, and panic hardware: 5 years.
2. Door closers and continuous hinges: 10 years.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: AHC certified hardware consultant to 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:

08 71 00-2
DOOR HARDWARE

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.

2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR's office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 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, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.

6. Installation.
7. Adjusting.
8. Repair.
9. Field quality control.
10. Cleaning.

1.9 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mates, 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 7-Pin 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 . Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the COR.

1.10 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.
- B. ASTM International (ASTM) :
E2180-18.....Standard Test Method for Determining the
Activity of Incorporated Antimicrobial Agent(s)
In Polymeric or Hydrophobic Materials
- C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA) :
A156.1-06 Butts and Hinges
A156.2-03 Bored and Pre-assembled Locks and Latches
A156.3-08 Exit Devices, Coordinators, and Auto Flush Bolts
A156.4-08 Door Controls (Closers)

- A156.5-14 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
- A156.25-07 Electrified Locking Devices
- A156.26-06 Continuous Hinges
- A156.28-07 Master Keying Systems
- A156.30-03 High Security Cylinders
- A156.31-07 Electric Strikes and Frame Mounted Actuators
- A156.36-10 Auxiliary Locks
- A250.8-03 Standard Steel Doors and Frames
- 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)
- F. Architectural Barriers Act Accessibility Standards (ABAAS)

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear 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. Hinges for exterior fire-rated doors shall be of stainless steel material.
 - 2. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide.

Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.

- B. Provide quantity and size of hinges per door leaf as follows:
1. Doors up to 1210 mm (4 feet) high: 2 hinges.
 2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
 3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
 4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
 5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 7. Provide heavy-weight hinges where specified.
 8. At doors weighing 330 kg (150 pounds) or more, furnish 127 mm (5 inch) high hinges.
- C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.2 DOOR CLOSING DEVICES

- A. Closing devices shall be products of one manufacturer.

2.3 OVERHEAD CLOSERS

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
 2. Where specified, closer shall have hold-open feature.
 3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
 4. Material of closer body shall be forged or cast.
 5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.

6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 1/2" (38mm) minimum piston diameter.

2.4 DOOR STOPS

- A. Conform to ANSI A156.16.
- B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use expansion shields for mounting door stops.

- C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.
- D. Provide floor stops (Type L02141 or L02161) in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
- E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
- F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.
- G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.
- H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.
- I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.
- J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.
- K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.
- L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.5 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.

2.6 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.7 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. Provide temporary keying device or construction core 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, except on designated doors in Psychiatric (Mental Health) areas, shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design matching [Sargent WTJ Lever. 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. All lock cases installed on lead lined doors

shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.

2.8 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

2.9 KEY CABINET (NOT USED)

2.10 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick plates, mop plates and armor plates of metal, Type J100 series.
2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.

3. Kick plates and/or mop plates are not required on following door sides:
 - a. Armor plate side of doors;
 - b. Exterior side of exterior doors;
 - c. Closet side of closet doors;
 - d. Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets".

Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.
5. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick plate in place of armor plate. Size of stretcher plate and kick plate shall be 254 mm (10 inches) high.
6. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

2.11 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless

otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.

C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.

D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.

E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

1. Hinge and Power Transfer

- a. Power transfer section of hinge shall be housed at the top end of the continuous hinge to eliminate the potential of exposed wires or flex conduit.
- b. The power transfer section of the hinge shall be field removable to eliminate the need to remove the door when addressing electrical service issues.

2. Remote Monitoring Panel and Audible Alarm:

- a. The remote monitoring panel shall allow monitoring of each patient bedroom door from the nurse's station with a visual indicator of the location of the ligature-initiated event.
- b. The remote audible alarm will be a distinct tone not to be confused with other alarms located in the vicinity.

3. Control Panel:

- a. Panel and all elements of the alarm system shall be equipped with a dedicated battery backup system and emergency power feed for maintaining power to the control panel in the event of a power failure due to a power outage.

b. Provide software for printing documented alarm events

2.12 THRESHOLDS

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. For thresholds at elevators entrances see other sections of specifications.
- C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.13 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND WEATHERSTRIPS (FOR EXTERIOR DOORS)

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length ($0.000774\text{m}^3/\text{s}/\text{m}$).

2.14 MISCELLANEOUS HARDWARE

- A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type 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 Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur, except as otherwise specified. Provide cylinders to operate locking devices where specified for following partitions and doors:

1. Folding doors and partitions.
2. Wicket door (in roll-up door assemblies).
3. Slide-up doors.
4. Swing-up doors.
5. Fire-rated access doors-Engineer's key set.
6. Doors from corridor to electromagnetic shielded room.

7. Day gate on vault door.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.15 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 626 or 630.
2. Hinges --interior doors: 652 or 630.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Thresholds: Mill finish aluminum.
6. Cover plates for floor hinges and pivots: 630.
7. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Special Finish: Exposed surfaces of hardware for dark bronze anodized aluminum doors shall have oxidized oil rubbed bronze finish (dark bronze) finish on door closers shall closely match doors.

2.16 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

- A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VA COR for approval.
- B. 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:
- C. Hardware Heights from Finished Floor:
- 1.Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
 - 2.Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
 - 3.Deadlocks centerline of strike 1219 mm (48 inches).
 - 4.Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
 - 5.Centerline of door pulls to be 1016 mm (40 inches).
 - 6.Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
 - 7.Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
 - 8.Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors . At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with hex nuts and bolts; foot shall be fastened to frame with machine screws. Door opening force shall not exceed 22.2 N (5 pounds) maximum in accordance with ABAAS. Measure and adjust opening force for all doors equipped with closers.

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:

Door Description	Number butts
Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; show in presence of COR that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the COR for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:

- 1.Re-adjust hardware.
- 2.Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
- 3.Identify items that have deteriorated or failed.
- 4.Submit written report identifying problems.

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Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-CSI-241
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Bid Documents

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

3.5 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

ELECTRIC HARDWARE ABBREVIATIONS LEGEND:

ADO = Automatic Door Operator

EMCH = Electro-Mechanical Closer-Holder

MHO = Magnetic Hold-Open (wall- or floor-mounted)

C. INTERIOR SINGLE DOORS

Set: HW-4G

Doors: BB-20B

3 Hinge (A8111)	T4A3786	US26D	MK
1 Classroom Lock (F05)	70 8237 WTJ	US26D	SA
1 SFIC Core (E09241)	7 Pin - SFIC Core - Key to the existing key system	26	BE
1 Surface Closer (C02011 / C02021)	7500	689	NO
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
3 Silencer (L03011)	608		RO

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Set: HW-5

Doors: BA-70A, BA-70B, T-17

3 Hinge (A8111)	T4A3786	US26D	MK
1 Storeroom/Closet Lock (F07)	70 8204 WTJ	US26D	SA
1 SFIC Core (E09241)	7 Pin - SFIC Core - Key to the existing key system	26	BE
1 Surface Closer (C02011 / C02021)	7500	689	NO
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
3 Silencer (L03011)	608		RO

Set: HW-5A

Doors: BA-70C

3 Hinge (A8111)	T4A3786	US26D	MK
1 Storeroom/Closet Lock (F07)	70 8204 WTJ	US26D	SA
1 SFIC Core (E09241)	7 Pin - SFIC Core - Key to the existing key system	26	BE
1 Surface Closer (C02011 / C02021)	7500	689	NO
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
1 Adhesive Gasket (R0Y154)	S88BL		RO

Set: HW-5D

Doors: BA-44C, BB-18C, BB-20A

3 Hinge (A8111)	T4A3786	US26D	MK
1 Storeroom/Closet Lock (F07)	70 8204 WTJ	US26D	SA
1 SFIC Core (E09241)	7 Pin - SFIC Core - Key to the existing key system	26	BE
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
1 Adhesive Gasket (R0Y154)	S88BL		RO

Set: HW-12H

Doors: S4-A, S4-B

3 Hinge (A8111)	T4A3786	US26D	MK
1 Electric Power Transfer	CEPT-10	630	SU
1 Rim Exit Device (Type 1, 14, E04)	12 43 55 8815 ETJ	US32D	SA

08 71 00-19
DOOR HARDWARE

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1 Auto Operator	BY BESAM (Div. 087113)		BM
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
1 Frame Harness	QC-C1500P		MK
1 Door Harness	QC-C		MK
1 Position Switch (E08)	DPS-M-BK		SU
2 Actuator	BY BESAM (Div. 087113)		BM
1 Power Supply	AQD (Size and Accessories as Required)		SU

Notes: Door normally closed and latched.

Entry by turning lever on exit trim, egress by pressing exit device push bar.

Inside/outside actuator switch is always functional to activate automatic operator for accessibility needs.

Loss of power maintains exit device latching, automatic door operator loses the electrically open operation, yet operator will function as a normal mechanical door closer.

Set: HW-13

Doors: C006

0 All Hardware BY DOOR SUPPLIER

D. EXTERIOR SINGLE DOORS

Set: HW-E4

Doors: T-01A

3 Hinge (A5111)	T4A3386	US32D	MK
1 Rim Exit Device (Type 1, 01)	LD 43 8810 EO (Less Dogging)	US32D	SA
1 Surface Closer (C02021)	UNI7500	689	NO
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Head Gasketing (R0Y164)	2893AV		PE
2 Jamb Gasketing (R0Y164)	2903AV		PE
1 Rain Guard (R0Y976)	346C		PE
1 Sweep (R0Y416)	18061CNB		PE
1 Threshold (outswing door)	273x224AFGT		PE

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SECURITY HARDWARE ABBREVIATIONS LEGEND:

AC = Access Control Device (Card reader, biometric reader, keypad, etc.)
ADO = Automatic Door Operator
DEML = Delayed Egress Magnetic Lock
DEPH = Delayed Egress Panic Exit Device
DPS = Door Position Switch (Door or Alarm Contact)
EL = Electric Lock or Electric Lever Exit Device
PB = Push-button Combination Lock (stand-alone)
RR = Remote Release Button
ELR = Electric Latch Retraction Exit Device
REX = Request-to-Exit Switch in Latching Device Inside Trim

E. INTERIOR SINGLE SECURITY DOORS

Set: HW-SH-5

Doors: T-01

3 Hinge (A8111)	T4A3786	US26D	MK
1 Electric Power Transfer	CEPT-10	630	SU
1 Rim Exit Device (Type 1, 03, E01, E04)	12 43 55 56 70 8804 ETJ	US32D	SA
1 SFIC Core (E09241)	7 Pin - SFIC Core - Key to the existing key system	26	BE
1 Auto Operator	BY BESAM (Div. 087113)		BM
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Wall Stop (L02101)	401	US26D	RO
1 Frame Harness	QC-C1500P		MK
1 Door Harness	QC-C		MK
1 Position Switch (E08)	DPS-M-BK		SU
1 Card Reader	BY SECURITY INTEGRATOR		
2 Actuator	BY BESAM (Div. 087113)		BM
1 Power Supply	AQD (Size and Accessories as Required)		SU

Notes: Door normally closed and locked.

Entrance by valid card to card-reader.

Free egress at all times.

Valid card to card-reader allows locked side actuator switch to

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function for activating automatic operator for ingress.
Inside (egress side) actuator switch is always functional to activate automatic operator for accessibility needs.
Loss of power maintains security from locked side of opening, automatic door operator loses the electrically open operation, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only.
Door monitored for door ajar or forced open.

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SECTION 08 71 13.11
LOW ENERGY POWER ASSIST DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low-energy, power-assisted automatic swing door operators.

1.2 RELATED WORK

- A. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS: Commissioning.
- B. Section 08 11 13, HOLLOW METAL DOORS AND FRAMES: Steel Doors.
- C. Section 08 14 00, INTERIOR WOOD DOORS: Wood Doors.
- D. Section 08 71 00, DOOR HARDWARE: Door Hardware.
- E. Division 26, ELECTRICAL: Electric General Wiring, Connections and Equipment Requirements.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 - B209-14 Aluminum and Aluminum-Alloy Sheet and Plate.
 - B221-14 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. Builders Hardware Manufacturers Association, Inc. (BHMA):
 - 156.19-07 Power Assist and Low Energy Power Operated Doors.

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. Contractor.
 - c. Installer.
 - d. Other installers responsible for adjacent and intersecting work, including electrical wiring installers.

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.
- C. Manufacturer's Literature and Data:

1. Description of each product.
 2. Maintenance manuals.
 3. Installation instructions.
 4. Warranty.
- D. Certificates: Certify products comply with specifications.
1. Show door operator is UL Listed for specified application.
- E. 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.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
- B. Installer Qualifications:
1. Regularly installs specified products.

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. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.9 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: 10 years.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Power assisted automatic door equipment accommodating normal traffic as well as the weight of the doors; UL approved and comply with applicable codes. Basis of Design; Besam. Contact Arnie Kravitz at ASSA ABLOY

Entrance Systems US Inc., 300 Horizon Center, Suite 302, Hamilton, NJ
08691-1905; aenirkravitz@assaabloy.com.

2.2 SYSTEM PERFORMANCE

- A. Opening Force: Maximum 67 N (15 pound force).
- B. Cycle Tests: 300,000 cycles.
 - 1. Use the widest and heaviest door specified as a test specimen.
Narrower or lighter doors of the same configurations will be considered to meet the cycle test requirements.

2.3 MATERIALS

- A. Aluminum:
 - 1. Sheet: ASTM B209.
 - 2. Extrusions: ASTM B221.

2.4 PRODUCTS - GENERAL

- A. Provide automatic door operators from one manufacturer.

2.5 LOW-ENERGY AUTOMATIC DOOR OPERATORS

- A. Conform to BHMA A156.19.
- B. Mounting: Surface-mounted.
- C. Enclosure: Self-contained within an extruded aluminum housing (alloy 6063-T6) to conceal operator mechanism and mounting brackets and with removable access cover with an overall maximum size of 140 mm (5-1/2 inches) wide by 150 mm (6 inches) deep.
- D. Safety Features:
 - 1. Adjustable time delay.
 - 2. Adjustable speed for opening and closing operations.
 - 3. Adjustable backcheck.
 - 4. Decals indicating "In" or "Do Not Enter" installed on both faces of each door where shown conforming to the requirements of ANSI/BHMA A156.19.
 - 5. Re-activation sensor mounted on the push-side door face near the top detect any person standing in the door swing path and prevent the door from closing.
 - 6. Motion sensor to detect any person standing in the door swing path and prevent the door from opening.
 - a. Adjustable door sensor system providing complete operation and safety zone coverage.
- E. Power Units:

1. Self-contained electric circuits for automatic operators located on each floor of the building.
2. Interruption or failure of power circuits for operators located on one floor of the building shall not interfere with continuous performance of automatic operated doors located on other floors.
3. Power units designed to not interfere with continuous performance of automatic operated doors located on other floors in the case of power interruption or failure.
4. Capacity and size of power circuits according to automatic operator manufacturer's specifications.

2.6 OPERATION

A. Traffic Operation:

1. Single Door: One way.
2. Double Doors: Two way Double egress Double swing.

B. Operator: Electromechanical; surface-mounted.

1. Operators to have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
2. Operators to recycle doors instantaneously to full open position from any point in closing cycle when control switch is reactivated.
3. Operators to allow manual door control in event of power failure.

C. Controls: Solid-state type.

D. Activation: Card Reader or Push-plate switch.

2.7 FINISHES

A. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.
3. Clear Anodized Finish: AA-C22A31; Class II Architectural, 0.01 mm (0.4 mil) thick.
4. Color Anodized Finish: AA-C22A32 or AA-C22A34; Class II Architectural, 0.01 mm (0.4 mil) thick.

B. Aluminum Paint finish:

1. Baked-Enamel or Powder-Coat: AAMA 2603; dry film thickness of 0.04 mm (1.5 mils).

2.8 ACCESSORIES

A. Signage: BHMA standard for operation and door type specified.

B. Fasteners: Corrosion-resistant, compatible with adjoining materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions effecting work, including door and frame preparation and electrical rough-ins.

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. Coordinate installation of equipment with other related work.

C. Mount manual controls and power disconnect switches recessed or semi-flush in partitions.

D. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment in finish work.

E. Install power units and controls in locations indicated.

1. Where units are to be mounted on walls, provide metal supports or shelves for the units.

3.3 ADJUSTING

A. All equipment, including time delay switches, to be accessible for maintenance and adjustment.

B. Adjust operators to function properly for the type of traffic (pedestrians) expected to pass through doors.

C. Adjust each door leaf of pairs of doors to open and close in synchronization.

D. On pairs of doors, adjust operators allowing either door to be opened manually without the other door opening.

3.4 DEMONSTRATION AND TRAINING

A. Instruct VA personnel in proper door operator operation and maintenance.

1. Trainer: Manufacturer approved instructor.

B. Submit training plan and trainer qualifications. See Section 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS.

C. Acceptance Condition: After completing work, operate door operators 15 consecutive calendar days without breakdown.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies subsurface preparation requirements for areas to receive the installation of applied and resinous flooring. This section includes 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 67 23.50, RESINOUS (Epoxy Terrazzo) FLOORING (RES-5).

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
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. ASTM International (ASTM):
D638-14(2014) Standard Test Method for Tensile Properties of Plastics
D4259-18(2019) Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application.

C109/C109M-20b(2020) ...Standard Test Method for Compressive Strength
of Hydraulic Cement Mortars (Using 2-in. or
[50-mm] Cube Specimens
7234-19(2020) Standard Test Method for Pull-Off Adhesion
Strength of Coatings on Concrete Using Portable
Pull-Off Adhesion Testers
E96/E96M-16(2016) Standard Test Methods for Water Vapor
Transmission of Materials
F710-1e1(2020) Standard Practice for Preparing Concrete Floors
to Receive Resilient Flooring
F1869-16a Standard Test Method for Measuring Moisture
Vapor Emission Rate of Concrete Subfloor Using
Anhydrous Calcium Chloride
F2170-19a(2020) Standard Test Method for Determining Relative
Humidity in Concrete Floor Slabs Using in situ
Probes
C348-20(2020) Standard Test Method for Flexural Strength of
Hydraulic-Cement Mortars
C191-19(2020) 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 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 must 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.

2.2

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	SCAMD Rule 1113 (Ammended 02/05/2016)	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

CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

- A. System Descriptions:
 - 1. High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.
- B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.
- C. System Characteristics:
 - 1. Wearing Surface: smooth
 - 2. Thickness: Per architectural drawings, ranging from feathered edge to 1", per application. Applications greater than 1" require additional 3/8" aggregate to mix or as recommended by manufacturer.

- D. Underlayment must 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 must receive the application of 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.
 - d. All puddles must be removed, and material must be allowed to dry, 1-2 hours at 70F/21C.
 - e. Number of Coats: (1) one.
 - 2. Grout Resurfacing Base:
 - a. Formulation Description: Single component, cementitious self-leveling high-early and high-ultimate strength grout.
 - b. Application Method: colloidal mix pump, cam rake, spike roll.
 - 1) Thickness of Coats: Per architectural scope, 1" lifts.
 - 2) Number of Coats: More than one if needed.
 - c. Aggregates: for applications greater than 1inch, require additional 3/8" aggregate to mix.

Property	Test	Value
Compressive Strength	ASTM C109/C109M	2,200 psi @ 24 hrs 3,000 psi @ 7 days
Initial set time Final Set time	ASTM C191	30-45 min. 1 to 1.5 hours
Bond Strength	ASTM D7234	100% bond to concrete failure

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.
- C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION

- A. Existing concrete slabs with existing floor coverings:
 - 1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
 - 2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.
- B. Concrete must 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 must 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 must meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer. Tolerance must 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 CEMENTITIOUS 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, or to address non-moving cracks or joints.
- B. Mix and apply in accordance with manufacturer's instructions.

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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 must be conducted by a qualified, independent testing facility.

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

- A. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- B. Section 07 21 13, THERMAL INSULATION; Acoustical Insulation
- B. Section 07 92 00, JOINT SEALANTS.
- B. Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Hollow metal door frames.
- B. Section 08 31 13, ACCESS PANELS.
- B. 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 rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society For Testing And Materials (ASTM)
- | | |
|-----------------|--|
| A641-09 | Zinc-Coated (Galvanized) Carbon Steel Wire |
| A653/653M-11 | Specification for Steel Sheet, Zinc Coated
(Galvanized) or Zinc-Iron Alloy-Coated
(Galvannealed) by Hot-Dip Process. |
| C11-10 | Terminology Relating to Gypsum and Related
Building Materials and Systems |
| C635-07 | Manufacture, Performance, and Testing of Metal
Suspension System for Acoustical Tile and
Lay-in Panel Ceilings |
| C636-08 | Installation of Metal Ceiling Suspension
Systems for Acoustical Tile and Lay-in Panels |
| C645-09 | Non-Structural Steel Framing Members |
| C754-11 | Installation of Steel Framing Members to
Receive Screw-Attached Gypsum Panel Products |
| C841-03 (R2008) | Installation of Interior Lathing and Furring |
| C954-10 | Steel Drill Screws for the Application of
Gypsum Panel Products or Metal Plaster Bases to
Steel Studs from 0.033 in. (0.84 mm) to 0.112
in. (2.84 mm) in Thickness |
| E580-11 | Application of Ceiling Suspension Systems for
Acoustical Tile and Lay-in Panels in Areas
Requiring Moderate Seismic Restraint. |

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
 - 1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
 - 2. Runners same thickness as studs.
 - 3. Exception: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 (Approved May 2012) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. The submission of an evaluation report is acceptable to show conformance to this requirement. Use C 645 steel, 0.48mm (0.019 inch) minimum base-metal (19 mil).
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

2.3 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:
 - 1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
 - 2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.
- C. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.

- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.
- F. Tie Wire and Hanger Wire:
 - 1. ASTM A641, soft temper, Class 1 coating.
 - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- G. Attachments for Wall Furring:
 - 1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
 - 2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.
- H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 610 mm (24 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for all partitions.
- G. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
 - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- H. Fastening Studs:
 - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
 - 2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- I. Chase Wall Partitions:
 - 1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 - 2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- J. Form building expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the expansion joint.
- K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:

1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
 2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
 3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.
- C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:
1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
 2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
 3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
 4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
 5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
 6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.
- D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING SHAFT WALL SYSTEM (NOT USED)

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
 - 1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
 - 2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
- B. New exposed concrete slabs:
 - 1. Use metal inserts required for attachment and support of hangers or hanger wires with tied wire loops for embedding in concrete.
 - 2. Furnish for installation under Division 3, CONCRETE.
 - 3. Suspended ceilings under concrete rib construction shall have runner channels at right angles to ribs and be supported from ribs with hangers at ends and at 1200 mm (48-inch) maximum intervals along channels. Stagger hangers at alternate channels.
- C. Concrete slabs on steel decking composite construction:
 - 1. Use pull down tabs when available.
 - 2. Use power activated fasteners when direct attachment to structural framing can not be accomplished.
- D. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.
- E. Existing concrete construction exposed or concrete on steel decking:
 - 1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
 - 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.
- F. Steel decking without concrete topping:
 - 1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
 - 2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.
- G. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
 - 1. Install only for ceilings to receive screw attached gypsum board.
 - 2. Install in accordance with ASTM C636.

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- a. Install main runners spaced 1200 mm (48 inches) on center.
- b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
- c. Install wall track channel at perimeter.

3.7 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- C. Level or align ceilings within 3 mm (1/8-inch.)

- - - E N D - - -

SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 05 40 00, COLD-FORMED METAL FRAMING, and Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Sound deadening board: Section 07 21 13, THERMAL INSULATION.
- C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Paint: Section 09 91 00, PAINTING.
- E. Room Finish Schedule and Material Schedule: See drawings.

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.

4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

1. Fire rating test, each fire 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

In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

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

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

- C11-15 Terminology Relating to Gypsum and Related Building Materials and Systems
- C475-15 Joint Compound and Joint Tape for Finishing Gypsum Board
- C840-13 Application and Finishing of Gypsum Board
- C919-12 Sealants in Acoustical Applications
- C954-15 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness
- C1002-14 Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- C1047-14 Accessories for Gypsum Wallboard and Gypsum Veneer Base
- C1177-13 Glass Mat Gypsum Substrate for Use as Sheathing

C1178/C1178M-18 Specification for Coated Glass Mat Water
Resistant Backing Panel

C1658-13 Glass Mat Gypsum Panels

C1396-14 Gypsum Board

C. Underwriters Laboratories Inc. (UL):

Latest Edition Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

- A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise.
- B. Coreboard or Shaft Wall Liner Panels.
 - 1. ASTM C1396, Type X.
 - 2. ASTM C1658: Glass Mat Gypsum Panels,
 - 3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.
- C. Water Resistant Gypsum Backing Board: ASTM C1178, Type X, 16 mm (5/8 inch) thick.
- D. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 GYPSUM SHEATHING BOARD (NOT USED)

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 rated construction, type and size same as used in fire rating test.
- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

- A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:
 - 1. Two sides of partitions:
 - 2. One side of partitions or furring:
 - a. Inside of exterior wall furring or stud construction.
 - b. Room side of room without suspended ceilings.
 - c. Furring for pipes and duct shafts, except where fire rated shaft wall construction is shown.
 - 3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
- D. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- E. Bring gypsum board into contact, but do not force into place.
- F. Ceilings:
 - 1. For single-ply construction, use perpendicular application.
 - 2. For two-ply assemblies:
 - a. Use perpendicular application.
 - b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
- G. Walls (Except Shaft Walls):

1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
 2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
 3. Stagger screws on abutting edges or ends.
 4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 5. 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. Installing Two Layer Assembly Over Sound Deadening Board:
 - a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
 - b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.
 9. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings.
 - 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.
3. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.

I. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
 - d. Where shown.

3.3 INSTALLING GYPSUM SHEATHING (NOT USED)

3.4 CAVITY SHAFT WALL (NOT USED)

3.5 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.

- B. Before proceeding with installation of finishing materials, assure the following:
1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated smoke barrier, fire rated and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and sound rated construction. Sanding is not required of non decorated surfaces.

3.6 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.7 UNACCESSIBLE CEILINGS (NOT USED)

- - - E N D - - -

SECTION 09 30 00
SPECIALTY MOLDINGS AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Specialty moldings and trim for floor and walls including the following:
 - 1. Resilient Flooring Trims
 - 2. Edge Protection and Transition Profiles for Floors
 - 3. Finishing and edge protection for walls

1.2 RELATED SECTIONS

- A. Concrete Subfloor: Section 03 30 53, SHORT-FORM CAST-IN-PLACE CONCRETE
- B. Tiling: Section 09 30 00, TILING
- C. Resilient Sheet Flooring: Section 09 65 16 - WELDED SEAM SHEET FLOORING
- D. Resilient Flooring: Section 09 65 19 - RESILIENT TILE FLOORING.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of

this section with minimum two years documented experience with projects of similar scope and complexity.

- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.5 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees must include Architect, Contractor and trades involved. Agenda must include schedule, responsibilities, critical path items and approvals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 PRODUCTS

2.1 RESILIENT FLOORING TRIMS

- A. TS-2: Powerhold Bevel Cap for resilient floors to sealed concrete

floors.

1. Profile Height: As required to coordinate with resilient flooring.
- B. TS-3: Schluter Vinpro-S for new resilient flooring to existing terrazzo flooring.
 1. Profile Height: As required to coordinate with resilient flooring and existing terrazzo flooring.
 2. Feather finish underlayment as required for smooth transition from existing terrazzo flooring.
- C. TS-4: Mannington Fusion Transition Strip for resilient flooring to new or existing resilient flooring.
 1. Profile Height: As required to coordinate with resilient flooring.

2.2 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

- A. TS-1: Schluter RENO-U Profile with sloped exposed surface, 5/32 inch (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 1. Profile Height: As required to coordinate with tile selection and setting system.

2.3 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS AND COUNTERTOPS

- A. TR-1: Schluter JOLLY L-shaped profile. 1/8 inch (3 mm) wide top and vertical wall sections that together form the visible surface. Integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 1. Anchoring Leg: Straight anchoring leg.
 2. Profile Height: As required to coordinate with tile selection and setting system.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

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- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.

3.4 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior ceramic, porcelain and quarry tile, marble thresholds and window stools, terrazzo divider strips, waterproofing membranes for thin-set applications, crack isolation membranes, and tile backer board.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Section 07 92 00, JOINT SEALANTS: Sealing of Joints.
- C. Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES: Preformed expansion joints in tile flooring.
- D. Section 09 65 16, RESILIENT SHEET FLOORING: Metal and Resilient Edge Strips at Joints with New Resilient Flooring.

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. Base tile, each type, each color, each size.
 2. Porcelain tile, each type, color, patterns and size.
 3. Wall (or wainscot) tile, each color, size and pattern.
 4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
- D. Product Data:
1. Ceramic and porcelain tile, marked to show each type, size, and shape required.
 2. Chemical resistant mortar and grout (epoxy and furan).
 3. Cementitious backer unit.
 4. Dry-set portland cement mortar and grout.
 5. Divider strip.
 6. Elastomeric membrane and bond coat.

7. Reinforcing tape.
8. Leveling compound.
9. Latex-portland cement mortar and grout.
10. Commercial portland cement grout.
11. Organic adhesive.
12. Slip resistant tile.
13. Waterproofing isolation membrane.
14. 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 mortar and grout (epoxy and furan).
 - b. Modified epoxy emulsion.
 - c. Commercial portland cement grout.
 - d. Cementitious backer unit.
 - e. Dry-set portland cement mortar and grout.
 - f. Elastomeric membrane and bond coat.
 - g. Reinforcing tape.
 - h. Latex-portland cement mortar and grout.
 - i. Leveling compound.
 - j. Organic adhesive.
 - k. Waterproof isolation membrane.
 - l. Factory back mounted tile documentation for suitability for application in wet area.

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 to be from a company specializing in performing installation of products specified and have a minimum of three (3) years' experience.
- B. Each type and color of tile to be provided from a single source.

- C. Each type and color of mortar, adhesive, and grout to be provided from the same source.

1.6 WARRANTY

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

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
- A10.20-06(R2016) Safe Operating Practices for Tile, Terrazzo and Marble Work
 - A108/A118/A136.1:2021 ..Installation of Ceramic Tile
 - A108.01-21 Subsurfaces and Preparations by Other Trades
 - A108.02-21 Materials, Environmental, and Workmanship
 - A108.1A-21 Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
 - A108.1B-21 Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
 - A108.1C-21 Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
 - A108.4-21 Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive
 - A108.5-21 Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
 - A108.6-21 Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
 - A108.8-21 Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout
 - A108.9-21 Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout
 - A108.10-21 Grout in Tilework

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- A108.11-21 Interior Installation of Cementitious Backer
Units
- A108.12-21 Installation of Ceramic Tile with EGP (Exterior
Glue Plywood) Latex-Portland Cement Mortar
- A108.13-21 Load Bearing, Bonded, Waterproof Membranes for
Thin-Set Ceramic Tile and Dimension Stone
- A108.14-21 Paper-Faced Glass Mosaic Tile
- A108.15-19 Alternate Method: Paper-Faced Glass Mosaic Tile
- A108.17-16 Crack Isolation Membranes for Thin-Set Ceramic
Tile and Dimension Stone
- A118.1-21 Dry-Set Portland Cement Mortar
- A118.3-21 Chemical Resistant, Water Cleanable Tile-
Setting and -Grouting Epoxy and Water Cleanable
Tile-Setting Epoxy Adhesive
- A118.4-21 Modified Dry-Set Cement Mortar
- A118.5-21 Chemical Resistant Furan Mortars and Grouts
- A118.6-21 Standard Cement Grouts for Tile Installation
- A118.7-21 High Performance Cement Grouts for Tile
Installation
- A118.8-21 Modified Epoxy Emulsion Mortar/ Grout
- A118.9-21 Cementitious Backer Units
- A118.10-21 Load Bearing, Bonded, Waterproof Membranes for
Thin-Set Ceramic Tile and Dimension Stone
Installation
- A118.11-21 EGP (Exterior Glue Plywood) Modified Dry-set
Mortar
- A118.12-21 Crack Isolation Membranes for Thin-Set Ceramic
Tile and Dimension Stone Installation
- A118.13-21 Bonded Sound Reduction Membranes for Thin-Set
Ceramic Tile Installation
- A118.15-21 Improved Modified Dry-Set Cement Mortar
- A136.1-21 Organic Adhesives for Installation of Ceramic
Tile
- A137.1-22 American National Standard Specifications for
Ceramic Tile

C. ASTM International (ASTM):

A666-23	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
A1064/A1064M-22	Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
C109/C109M-21	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)
C241/C241M-21	Abrasion Resistance of Stone Subjected to Foot Traffic
C348-21	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C627-18e1	Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
C954-22	Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness
C979/C979M-16	Pigments for Integrally Colored Concrete
C1002-22	Steel Self-Piercing Tapping Screws for the Application of Panel Products
C1027-19	Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
C1127/C1127M-15	Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface
C1178/C1178M-18	Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
C1325-22e1	Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
C1353/C1353M-20e1	Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
D1204-14(2020)	Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
D2240-15(2021)	Test Method for Rubber Property - Durometer Hardness

D2497-07(2018) Tolerances for Manufactured Organic-Base
Filament Single Yarns

D3045-2018 Heat Aging of Plastics Without Load

D4397-16(2023) Standard Specification for Polyethylene
Sheeting for Construction, Industrial and
Agricultural Applications

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. Marble Institute of America (MIA)/ Building Stone Institute (BSI):
Dimension Stone Design Manual VIII-2016

F. Tile Council of North America, Inc. (TCNA):
Handbook for Ceramic Tile Installation (2020)G. TCNA DCOF AcuTest-
2012,Dynamic Coefficient of Friction Test

PART 2 - PRODUCTS

2.1 TILE

A. Comply with ANSI A137.1, Standard Grade, except as modified:

1. Inspection procedures listed under the Appendix of ANSI A137.1.

2. Abrasion Resistance Classification:

a. Tested in accordance with values listed in Table 1, ASTM C1027.

b. Class V, 12000 revolutions for floors in Corridors, Kitchens,
Storage including Refrigerated Rooms

c. Class IV, 6000 revolutions for remaining areas.

3. Slip Resistant Tile for Floors:

a. Coefficient of friction, when tested in accordance with
ANSI A137.1 and measured per the TCNA DCOF AcuTest.

1) Equal to or greater than .42 for level interior tile floors
that will be walked on when wet.

4. 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.

B. Glazed Wall Tile: Cushion edges, glazing.

- C. Porcelain Tile: 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 pounds).
- D. Trim Shapes:
1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed on construction documents or specified otherwise.
 3. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use a silicone sealant color matched to grout.
 - d. For unglazed ceramic mosaic and glazed wall tile installed in portland cement mortar setting bed, use cove and bullnose shapes as applicable. When ceramic mosaic wall and base tile is required, use C Series cove and bullnose shapes.
 - e. For unglazed ceramic mosaic and glazed wall tile installed in dry-set portland cement mortar, latex-portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.
 - f. For quarry tile work, use cove and bullnose shapes as applicable.
 - g. Provide cove and bullnose shapes where indicated in drawings, and required to complete tile work.

2.2 BACKER UNITS

- A. Cementitious Backer Units:
1. Use at all tiled walls.
 2. Conform to ASTM C1325; Type A.
 3. 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-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 resistant coated, with washers.
 3. ASTM C954 for steel 1 mm (0.033 inch) thick.
 4. ASTM C1002 for steel framing less than 0.0329 inch thick.
- B. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.

2.5 SETTING MATERIALS OR BOND COATS

- A. Conform to TCNA Handbook for Ceramic Tile Installation.
- B. Portland Cement Mortar: ANSI A108.02.
- C. Modified Dry-Set Cement Mortar: ANSI A118.4.
1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.
 2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
- D. Dry-Set Portland Cement Mortar: ANSI A118.1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.1.
- E. Organic Adhesives: ANSI A136.1, Type 1.
- F. Chemical-Resistant Bond Coat:
1. Epoxy Resin Type: ANSI A118.3.
 2. Furan Resin Type: ANSI A118.5.

2.6 GROUTING MATERIALS

- A. Coloring Pigments:
1. Pure mineral pigments, lime proof and nonfading, complying with ASTM C979/C979M.
 2. Coloring pigments may only be added to grout by the manufacturer.
 3. Job colored grout is not acceptable.
 4. Use is required in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.

B. 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. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Provide a patching and leveling compound with the following minimum physical properties:
 1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
 2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
 3. Tensile strength - 4.1 MPa (600 psi) per ANSI 118.7.
 4. Density - 1.9.
- C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 101 mm (4 inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.
- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

2.8 METAL DIVIDER STRIPS

- A. Terrazzo type divider strips, or as indicated on drawings.
- B. Heavy top type strip with 5 mm (3/16 inch) wide top and 38 mm (1 1/2 inch) long leg. Height to match tile and setting-bed thickness.
- C. Embedded leg perforated and deformed for keying to mortar.

2.9 WATER

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.10 CLEANING COMPOUNDS

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic Material are not acceptable.

2.11 FLOOR MORTAR BED REINFORCING

- A. ASTM A1064/A1064M welded wire fabric without backing, MW3 x MW3 (2 x 2-W0.5 x W0.5).

2.12 POLYETHYLENE SHEET

- A. Polyethylene sheet conforming to ASTM D4397.
- B. Nominal thickness: 0.15 mm (6 mils).

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degrees C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three (3) days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after third day of completion of tile work.

3.2 ALLOWABLE TOLERANCE

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
 - 1. Not more than 6 mm in 3048 mm (1/4 inch in 10 feet) from required elevation where portland cement mortar setting bed is used.
 - 2. Not more than 3 mm in 3048 mm (1/8 inch in 10 feet) where dry-set portland cement, and latex-portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
 - 1. Not more than 6 mm in 2438 mm (1/4 inch in 8 feet) from required plane where portland cement mortar setting bed is used.
 - 2. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where dry-set or latex-portland cement mortar or organic adhesive setting materials is used.

3.3 SURFACE PREPARATION

A. Cleaning New Concrete or Masonry:

1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.

B. Patching and Leveling:

1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
 - a. Thickness of compound as required to bring finish tile system to elevation shown on construction documents.
 - b. Float finish except finish smooth for elastomeric waterproofing.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

C. Mortar Bed for Slopes to Drains:

1. Slope compound to drain where drains are shown on construction documents.
2. Install mortar bed in depressed slab sloped to drains not less than 3.2 mm in 305 mm (1/8 inch per foot).
3. Allow not less than 50 mm (2 inch) depression at edge of depressed slab.
4. Screed for slope to drain and float finish.
5. Cure mortar bed for not less than seven (7) days. Do not use curing compounds or coatings.

6. Perform flood test to verify mortar bed slopes to drain before installing tile. Contracting Officer Representative (COR) to be present during flood test.
- D. Additional preparation of concrete floors for tile set with epoxy, or furan-resin is to be in accordance with the manufacturer's printed instructions.
- E. Cleavage Membrane:
 1. Install polythene sheet as cleavage membrane in depressed slab when waterproof membrane is not scheduled or indicated.
 2. Turn up at edge of depressed floor slab to top of floor.
- F. Walls:
 1. In showers or other wet areas cover studs with polyethylene sheet.
 2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
 3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
 4. Apply metal lath to framing in accordance with ANSI A108.1:
 - a. Use fasteners specified in paragraph "Fasteners." Use washers when lath opening is larger than screw head.
 - b. Apply scratch and leveling coats to metal lath in accordance with ANSI A108.1C.
 - c. Total thickness of scratch and leveling coats:
 - 1) Apply 9 mm to 16 mm (3/8 inch to 5/8 inch) thick over solid backing.
 - 2) 16 mm to 19 mm (5/8 to 3/4 inch) thick on metal lath over studs.
 - 3) Where wainscots are required to finish flush with wall surface above, adjust thickness required for flush finish.
 - d. Apply scratch and leveling coats more than 19 mm (3/4 inch) thick in two (2) coats.
- G. Existing Floors and Walls:
 1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.

2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.
3. Where new tile bases are required to finish flush with plaster above or where they are extensions of similar bases in conjunction with existing floor tiles, cut channel in floor slab and expose rough wall construction sufficiently to accommodate new tile base and setting material.

3.4 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. Where backer unit joins shower pans or waterproofing, lap backer unit over turned up waterproof system. Install fasteners only through top one-inch of turned up waterproof systems.
- F. Do not install joint treatment for seven (7) days after installation of cementitious backer unit.
- G. Joint Treatment:
 1. Fill horizontal and vertical joints and corners with latex-portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.
 2. Leave 6 mm (1/4 inch) space for sealant at lips of tubs, sinks, or other plumbing receptors.

3.5 METAL DIVIDER STRIPS

- A. Install metal divider strips in floor joints between ceramic and quarry tile floors and between tile floors and adjacent flooring of other

materials where the finish floors are flush unless shown otherwise on construction documents.

- B. Set divider strip in mortar bed to line and level centered under doors or in openings.

3.6 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. Installing Mortar Beds for Floors:
 - 1. Install mortar bed in a manner that does not damage cleavage or waterproof membrane; 32 mm (1-1/2 inch) minimum thickness.
 - 2. Install floor mortar bed reinforcing centered in mortar fill.
 - 3. Screed finish to level plane or slope to drains shown on construction documents, float finish.
 - 4. For thin set systems cure mortar bed not less than seven (7) days. Do not use curing compounds or coatings.
 - 5. For tile set with portland cement paste over plastic mortar bed coordinate to set tile before mortar bed sets.
- C. Setting Beds or Bond Coats:
 - 1. Where recessed or depressed floor slabs are filled with portland cement mortar bed, set ceramic mosaic floor tile in either portland cement paste over plastic mortar bed or latex-portland cement mortar over cured mortar bed except as specified otherwise, ANSI A108-1C, TCNA System F121-14 or F111-14.
 - 2. Set floor tile in elastomeric bond coat over elastomeric membrane per ANSI 108.13, TCNA System F122-14 where indicated on construction documents.
 - 3. Set wall tile installed over concrete or masonry in dry-set portland cement mortar, or latex-portland cement mortar, ANSI 108.1B and TCNA System W211-14, W221-14 or W222-14.
 - 4. Set wall tile installed over concrete backer board in latex-portland cement mortar, ANSI A108.1B.
 - 5. Set wall tile installed over portland cement mortar bed on metal lath base in portland cement paste over plastic mortar bed, or dry-set portland cement mortar or latex-portland cement mortar over a cured mortar bed, ANSI A108.1C, TCNA System W231-14, W241-14.

6. Set tile over concrete in therapeutic pools in portland cement paste or dry set portland cement mortar, ANSI A108.1C, TCNA System P601MB-14.
7. Set tile installed over gypsum board and gypsum plaster in organic adhesive, ANSI A108.1, TCNA System W242-14.
8. Set trim shapes in same material specified for setting adjoining tile.

D. Workmanship:

1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise on construction documents.
3. Form intersections and returns accurately.
4. Cut and drill tile neatly without marring surface.
5. Cut edges of tile abutting penetrations, finish, or built-in items:
 - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
 - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work is to be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
 - a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where indicated in construction documents.
 - c. In areas where floor drains occur, slope tile to drains.
 - d. Push and vibrate tiles over 203 mm (8 inches) square to achieve full support of bond coat.
9. 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.

10. Joints:

- a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise on construction documents.
- b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
- c. Make joints in quarry tile work not less than 6 mm (1/4 inch) nor more than 9 mm (3/8 inch) wide. Finish joints flush with surface of tile.
- d. Make joints in porcelain tile; maximum 3 mm (1/8 inch) wide.

11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108/A118/A136 series of tile installation standards:

- a. Tile wall installations in wet areas, including showers, tub enclosures, laundries and swimming pools.
- b. Tile installed with chemical-resistant mortars and grouts.
- c. Tile wall installations composed of tiles 203 by 203 mm (8 by 8 inches) or larger.
- d. Exterior tile wall installations.

3.7 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR

- A. Mortar Mixes for Floor, Wall and Base Tile: ANSI A108.1A. except specified otherwise.
- B. Installing Wall and Base Tile: ANSI A108.1A, except specified otherwise.
- C. Installing Floor Tile: ANSI A108.1A, except as specified otherwise. Slope mortar beds to floor drains at a minimum of 3 mm in 305 mm (1/8 inch per foot).

3.8 PORCELAIN TILE INSTALLED WITH LATEX PORTLAND CEMENT BONDING MORTAR

- A. Due to the denseness of porcelain tile use latex portland cement bonding mortar that meets the requirements of ANSI A108.01. Mix bonding

mortars in accordance with manufacturer's instructions. Provide liquid ratios and comply with dwell times during the placement of bonding mortar and tile.

3.9 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR

- A. Installation of Tile: ANSI A108.1B, except as specified otherwise.
- B. Slope tile work to drains at not less than 3 mm in 305 mm (1/8 inch per foot).

3.10 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH ORGANIC ADHESIVE

- A. Installation of Tile: ANSI A108.4.

3.11 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH CHEMICAL-RESISTANT BOND COAT

- A. Epoxy Resin Type: Install tile in accordance with Installation of Tile with Epoxy Mortar; ANSI A108.6.
- B. Furan Resin Type: Proportion, mix and place in accordance with the manufacturer's printed instructions. Set tile in accordance with ANSI A108.8.

3.12 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT

- A. Surface Preparation: Prepare surfaces as specified.
- B. Installation of Elastomeric Membrane: ANSI A108.10 and TCNA F122-14 (on ground concrete) and F122A-14 (above-ground concrete).
 - 1. Prime surfaces, where required, in accordance with manufacturer's instructions.
 - 2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.76 to 1.3 mm (30 to 50 mils).
 - 3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 101 mm (4 inches) above finish floor surface.
 - 4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
 - 5. After curing test for leaks with 25 mm (1 inch) of water for 24 hours.
- C. Installation of Tile in Elastomeric Membrane:
 - 1. Spread no more material than can be covered with tile before material starts to set.

2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

3.13 GROUTING

A. Grout Type and Location:

1. Grout for glazed wall and base tile, porcelain tile and unglazed mosaic tile: portland cement grout, latex-portland cement grout, dry-set grout, or commercial portland cement grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Sand Portland Cement Grout: ANSI A108.10.
3. Standard Cement Grout: ANSI A118.6.
4. High Performance Grout: ANSI A118.7.
5. Epoxy Grout: ANSI A108.6.
6. Water-Cleanable Epoxy Grout: ANSI A118.3.
7. Furan and Commercial Portland Cement Grout: ANSI A118.5 and in accordance with the manufacturer's printed instructions.

3.14 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.
- C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.
- D. Rake out grout at joints between tile, service sink, at toe of base, and where indicated in construction documents not less than 6 mm (1/4 inch) deep.

3.15 CLEANING:

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy, furan and commercial portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

VA Project 437-C SI-241
1-22-2025
Bid Documents

3.16 PROTECTION

- A. Keep traffic off tile floor, until grout and setting material is fully set and cured.
- B. Where traffic occurs over tile floor is unavoidable, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

3.17 TESTING FINISH FLOOR

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

- - - E N D - - -

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Acoustical units.
 2. Metal ceiling suspension system for acoustical ceilings.
 3. Adhesive application.

1.2 RELATED REQUIREMENTS

- A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, pattern, and location of each type of acoustical unit: See drawings.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
 2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
 3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 4. C634-13 - Terminology Relating to Environmental Acoustics.
 5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 7. D1779-98(2011) - Adhesive for Acoustical Materials.
 8. E84-15b - Surface Burning Characteristics of Building Materials.
 9. E119-16 - Fire Tests of Building Construction and Materials.
 10. E413-16 - Classification for Rating Sound Insulation.
 11. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
 12. E1264-14 - Classification for Acoustical Ceiling Products.
- C. International Organization for Standardization (ISO):
1. ISO 14644-1 - Classification of Air Cleanliness.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting minimum 30 days before beginning Work of this section.
 - 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.
 - d. 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.

1.5 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.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Ceiling suspension system indicating manufacturer recommendation for each application.
 - 3. Installation instructions.
 - 4. Warranty.
- D. Samples:
 - 1. Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.

- a. Submit quantity required to show full color and texture range.
2. Suspension system, trim and molding, 300 mm (12 inches) long.
3. Colored markers for access service.
4. Approved samples may be incorporated into work.
- E. Sustainable Construction Submittals:
 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 2. Biobased Content:
 - a. Show type and quantity for each product.
 - b. Show volatile organic compound types and quantities.
- F. Certificates: Certify products comply with specifications.
 1. Acoustical units, each type.
- G. Qualifications: Substantiate qualifications comply with specifications.
 1. Manufacturer.
- H. Operation and Maintenance Data:
 1. Care instructions for each exposed finish product.

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.

1.7 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.

1.8 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.9 FIELD CONDITIONS

- A. 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.

1.10 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: 1/360 of span, maximum.
- B. Surface Burning Characteristics: When tested according to ASTM E84.
 1. Flame Spread Rating: 25 maximum.
 2. Smoke Developed Rating: 450 maximum.

2.3 PRODUCTS - GENERAL

- A. Basis of Design: See drawings.
- 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.
- D. Sustainable Construction Requirements:
 1. Mineral Base Recycled Content: 50 percent, recycled content, minimum.
 2. Steel Recycled Content: 30 percent total recycled content, minimum.
 3. Aluminum Recycled Content: 50 percent total recycled content, minimum.
 4. Biobased Content: 37 percent by weight biobased material, minimum.
 5. 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 ACOUSTICAL UNITS

A. General:

1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
 - a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
2. Classification: Provide type and form as follows:
 - a. 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. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55 unless specified otherwise.
 - c. CAC (Ceiling Attenuation Class): ASTM E413, 40-44 range unless specified otherwise.
 - d. LR (Light Reflectance): Minimum 0.75.
3. Lay-in panels: Sizes as indicated on Drawings.

2.5 METAL SUSPENSION SYSTEM

- A. General: ASTM C635, intermediate-duty, 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.
- B. Exposed Grid Suspension System: Support of lay-in panels.
 1. Grid Width: 22 mm (7/8 inch) minimum with 8 mm (5/16 inch) minimum panel bearing surface.
 2. Molding: Fabricate from the same material with same exposed width and finish.
 3. Finish: Baked-on enamel flat texture finish.
 - a. Color: To match adjacent acoustical units unless specified otherwise in drawings.
- C. Suspension System Support of Metal Type V, VI, and VII Tiles: Concealed grid type with runners for snap-in attachment of metal tile (pans).
- D. 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

E. 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.

F. Clips: Galvanized steel, designed to secure framing member in place.

G. Tile Splines: ASTM C635.

H. Wire: ASTM A641.

1. Size:

- a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
- b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

2.6 ACCESSORIES

A. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.

B. 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.

C. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.

1. Color Code: Provide the following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water
Orange	Ductwork: Fire Dampers
Blue	Ductwork: Dampers and Controls
Black	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove existing acoustical panels and suspension system to permit new installation.
 1. Retain existing acoustical panels and suspension system for reuse.
 2. Dispose of other removed materials.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 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.
- 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. Replace cracked, broken, stained, dirty, or tile.
3. Tile in concealed grid upward access suspension system:
 - a. Install acoustical tile with joints close, straight and true to line, and with exposed surfaces level and flush at joints.
 - b. Make corners and arises full, and without worn or broken places.
 - c. Locate acoustical units providing access to service systems.
4. Adhesive applied tile:
 - a. Condition of surface according to ASTM D1779, Note 1, Cleanliness of Surface, and Note 4, Rigidity of Base Surface.
 - b. Size or seal surface as recommended by manufacturer of adhesive and allow to dry before installing units.
5. Markers:
 - a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
 - b. Attach colored markers to exposed grid on opposite sides of the units providing access.
 - c. Attach marker on exposed ceiling surface of upward access acoustical unit.
- D. Touch up damaged factory finishes.
 1. Repair painted surfaces with touch up primer.

3.4 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General: Install according to ASTM C636.
 1. Use direct or indirect hung suspension system or combination of both.
 2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
 3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
 4. Provide additional hangers located at each corner of support components.
 5. Provide 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.

B. Direct Hung Suspension System: ASTM C635.

1. Support main runners by hanger wires attached directly to the structure overhead.
2. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

C. Anchorage to Structure:

1. Concrete:
 - a. Install hanger inserts and wire loops required for support of hanger wire. Install hanger wires with looped ends through steel deck when steel deck does not have attachment device.
 - b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger wire. Install in sides of concrete beams or joists at mid height.
2. Steel:
 - a. Install carrying channels for attachment of hanger wires.
 - 1) Size and space carrying channels to support load within performance limit.
 - 2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
 - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.
 - c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

D. Indirect Hung Suspension System: ASTM C635.

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.

3.5 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.

C. Existing ceiling:

1. Where extension of existing ceilings occurs, match existing.
2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.6 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. 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):
- F1344-15 Rubber Floor Tile.
 - F1859-14e1 Rubber Sheet Floor Covering without Backing.
 - F1860-14e1 Rubber Sheet Floor Covering with Backing.
 - F1861-16 Resilient Wall Base.
 - D4259-18 Preparation of Concrete by Abrasion Prior to Coating Application.
- C. Federal Specifications (Fed. Spec.):
- RR-T-650E (1994) Treads, Metallic and Non-Metallic, Skid-Resistant.
- D. International Concrete Repair Institute (ICRI):
- 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. 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. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Low Pollutant-Emitting Materials:
 - a. Stair Treads and Sheet Rubber Flooring: Submit Floor Score label.
 - b. 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: See drawings.
- B. Provide each product from one manufacturer and from one production run.
- C. Sustainable Construction Requirements:
 1. Sheet Rubber Flooring Recycled Content: 90 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. Flooring Adhesives and Sealants.

2.2 RESILIENT BASE

- A. Resilient Base: 3 mm (1/8 inch) thick, 100 mm (4 inches) high.
 1. Type: Vinyl; use one type throughout.
 2. ASTM F1861, Type TP thermoplastic rubber or Type TV thermoplastic vinyl, Group 2 - layered.
- B. Applications:
 1. All Locations: Style B - Cove.

2.3 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.
- 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 Contracting Officer consideration.

3.3 RESILIENT BASE INSTALLATION

- A. Applications:
 - 1. Install resilient base in rooms scheduled on Drawings.
 - 2. Install resilient base on casework and locker toe spaces, 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. Field form corners and end stops.
 - 1. V-groove back of outside corner.
 - 2. V-groove face of inside corner and notch cove for miter joint.
- E. Roll resilient base ensuring complete adhesion.

3.4 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.
- C. Polish exposed resilient base to gloss sheen.

3.5 PROTECTION

- A. Protect products from construction traffic and operations.
 - 1. Cover installed product with reinforced kraft paper, and plywood or hardboard.
 - 2. Maintain protection until directed by Contracting Officer's Representative.
- B. Replace damaged products and re-clean.
 - 1. Damaged Products include cut, gouged, scraped, torn, and unbonded products.

- - E N D - -

SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Welded seam sheet flooring (WSF) 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: See drawings.

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. F1303-04(2014) - Sheet Vinyl Floor Covering with Backing.
 5. F1516-18 - Sealing Seams of Resilient Flooring Products by Heat Weld Method
 6. 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.
- D. SCS Global Services (SCS):
1. FloorScore.

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.
 3. Warranty.

C. Samples:

1. Sheet material, 300 mm (12 inches) square for each type, pattern and color with welded seam using specified welding rod.
2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.
3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
4. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.
5. Edge strips: 150 mm (6 inches) long each type.
6. Primer: Pint container, each type.

D. Sustainable Construction Submittals:

1. Low Pollutant-Emitting Materials:
 - a. Sheet Flooring: Submit FloorScore label.
 - b. Identify volatile organic compound types and quantities.

E. Certificates: Certify each product complies products comply with specifications.

1. Heat welded seaming is manufacturer's prescribed method of installation.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer.
2. Installer.

1.5 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.

1.6 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 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 WELDED SEAM SHEET FLOORING

- A. Welded Seam Sheet Flooring (WSF): ASTM F1516; Type II vinyl.
 1. Wear Surface: Smooth.
 2. Wear Layer Thickness: Minimum 2.54 mm (0.100 inches).
 3. Total Thickness: 2.5 mm (0.100 inches).
- B. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
 1. Minimum Width: 78 inches.

2.4 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. Base Accessories:
 1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with flooring material.
 2. Cap Strip: J-Shape extruded flanged reducer strip compatible with flooring material approximately 25 mm (1 inch) exposed height with 13 mm (1/2 inch) flange.
- D. Leveling Compound:
 1. Provide cementitious type with latex or polyvinyl acetate resins additive.
- E. Primer:
 1. Type recommended by adhesive or flooring manufacturer.
- F. Edge Strips:
 1. Extruded aluminum, mill finish, mechanically cleaned.
 2. 28 mm (1-1/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.
 3. Drill and counter sink edge strips for flat head screws. Space holes near ends and approximately 225 mm (9 inches) on center.
 4. Fasteners: Stainless steel, type to suit application.

G. Sealant:

1. As specified in Section 07 92 00, JOINT SEALANTS.
2. Compatible with flooring.

H. Polish: Type recommended by flooring manufacturer to suit application and anticipated traffic.

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. 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.
- D. 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.
- 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 310.2R CSP 3 to CSP 4.
- F. Perform flooring manufacturer's recommended bond, substrate moisture content, and pH tests.
- G. Broom or vacuum clean substrates immediately before flooring installation.
- H. 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 Contracting Officer's Representative consideration.

3.3 INSTALLATION OF FLOORING

- A. Flooring Layout:
 - 1. Arrange pattern in one direction with side joints pattern matched.
 - 2. Extend flooring wall-to-wall, under cabinets, casework, laboratory and pharmacy furniture, 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 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. Terminate base exposed top edge with cap strip. Seal cap strip to wall with sealant.
- F. 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 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean and polish materials.
- C. Vacuum floor thoroughly.
- D. Perform initial maintenance according to flooring manufacturer's instructions.
 - 1. Delay washing flooring until adhesive is fully set and welded joints can contain wash water.

3.7 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.
- F. Buff flooring to uniform sheen.

- - E N D - -

**SECTION 09 67 23.50
RESINOUS TERRAZZO FLOORING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies resinous terrazzo flooring systems with integral cove base.
- B. Resinous (Epoxy or urethane Terrazzo) Flooring Systems:
 - 1. Thin set: Epoxy or Urethane Matrix Terrazzo.

1.2 RELATED WORK

- A. Concrete and Moisture Vapor Barrier: Section 03 30 53, (SHORT-FORM) CAST-IN-PLACE CONCRETE.
- B. Substrate Preparation for Floor Finishes: Section 09 05 16.
- C. Sealants installed with Terrazzo: Section 07 92 00, JOINT SEALANTS.
- D. Color and location of each type of resinous flooring: See drawings.
- E. 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 postconsumer and pre-consumer recycled content.
 - a. Include statements indicating costs for each product having recycled content.
 - 2. Product data for field applied adhesives include printed statement of VOC content indicating compliance with environmental requirements.
- E. Samples:
 - 1. Each color and texture specified in drawings.

2. Samples for verification: For each (color and texture) resinous flooring system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.
 3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.
 4. Accessories: (6 inches) 152 mm long sample of exposed strip item.
- F. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
1. Patterns.
 2. Edge configurations.
 3. Divider strips.
 4. Control-joint strips.
 5. Accessory strips.
 6. Abrasive strips.
- G. Certifications and Approvals:
1. Manufacturer's certification of material and substrata 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 must certify that a particular resinous flooring system has been in use for a minimum of five 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 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 must have completed at least 10 projects of similar size and complexity. Include list of at least 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 aggregate, strips, patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.
3. Obtain aggregate colors, grade, type, and variety of granular materials from one source with resources to provide materials of consistent quality in appearance and physical properties.
4. Material furnished must meet NTMA Specifications.

D. NTMA Standards: Comply with NTMA's "Terrazzo Specification and Design Guide" and written recommendations for terrazzo type indicated unless more stringent requirements are specified.

E. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and establish quality standards for materials and execution.

1. Apply full-thickness mockups on 48 inch (1200 mm) square floor area selected by VA COR.
 - a. Include 48 inch (1200 mm) length of integral cove base.
2. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.
3. Sign off from VA COR and Manufacturer's Representative on color and texture must be complete before installation of flooring system.

F. Pre-Installation Conference:

1. Convene a meeting not less than thirty days prior to starting work.
2. Attendance:
 - a. Contractor
 - b. VA COR
 - c. Manufacturer and Installer's Representative
3. Review the following:
 - a. Environmental requirements
 - 1) Air and surface temperature

- 2) Relative humidity
- 3) Ventilation
- 4) Dust and contaminants
- b. Protection of surfaces not scheduled to be coated
- c. Inspect and discuss 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 (epoxy terrazzo) 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
- G. Manufacturer's Field Services: Manufacturer's representative must provide technical assistance and guidance for surface preparation and application of coating systems.
- H. Contractor Job Site Log: Contractor must document daily; the work accomplished environmental conditions and any other condition event significant to the long term performance of the terrazzo installation. The Contractor must maintain these records for one year after Substantial Completion.

1.5 MATERIAL PACKAGING DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
- C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).
- D. Keep containers sealed until ready for use.
- E. Do not use materials beyond manufacturer's shelf life limits.

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 applications.

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 must be properly cured per referenced section 03 30 53, (SHORT-FORM) 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, section 3.4, paragraph B, must employ an 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 section 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 & LEED	25 grams per liter
Permeance	ASTM E96 @ 16mils/ 0.4mm on concrete	0.1 perms
Tensile Modulus	ASTM D638	1.9X10 ⁵ psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufactures Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% 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: Manufacture must furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for a extended period of (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 (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 Surfacing," 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. ASTM International (ASTM):
 - C109/C109M-20b Compressive Strength of Hydraulic Cement Mortars
 - C307-18 Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
 - C413-18 Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes
 - C531-18 Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars,

	Grouts, Monolithic Surfacing, and Polymer Concretes
C579-18	Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
C580-18	Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
D638-14	Tensile Properties of Plastics
D790-17	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D130802(2013)	Effect of Household Chemicals on Clear and Pigmented Organic Finishes
D2240-15e1	Rubber Property-Durometer Hardness
D4060-19	Abrasion Resistance of Organic Coatings by the Taber Abraser
D4259-18	Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance
D7234-19	Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
E96/E96M-16	Water Vapor Transmission of Materials
F1679-04e1	Variable Incidence Tribometer for determining the slip resistance
F1869-16a	Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-19a	Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION FOR RESINOUS (EPOXY TERRAZZO) FLOORING

A. System Descriptions:

1. Monolithic, multi-layer, trowel applied multi-component epoxy composition terrazzo and integral cove base. UV stable and breathable where required.

- B. Systems must meet or exceed all applicable NTMA and TTMAC standards.
- C. System Components: Verify specific requirements as systems vary by manufacturer. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:
 - 1. Bond Coat (Primer): Verify inclusion of primer in manufacturer's system. Some systems are self-priming.
 - a. Resin: Epoxy.
 - b. Formulation Description: 100 percent solids.
 - c. Binder: Formulated to meet physical properties of MIL-D-3134F.
 - d. Application Method: Apply by spray, brush, or roller.
 - 1) Thickness of coats: Verify thickness as systems vary by manufacturer; approximate range from 5 to 6 mils (0.13 to 0.15 mm) to 150 to 250 square feet per gallon (52.76 to 87.93 square meters per liter).
 - 2. Body Coat:
 - a. Resin: Epoxy.
 - b. Formulation Description: 100 percent solids.
 - c. Application Method: Varies by manufacturer; hand or power troweled.
 - 1) Trowel application:
 - a) Thickness of coat: Verify thickness as systems vary by manufacturer; approximate range from 3/16 inch or 1/4 inch or 3/8 inch (4.76 to either 6.35 mm or 9.5 mm).
 - b) Number of coats: One.
 - d. Aggregates: Verify amount per thickness as systems vary by manufacturer:
 - 1) Marble (#1 size maximum), glass, or granite chips or, colored resilient aggregates, acrylic, or other approved materials.
 - 3. Grout Coat:
 - a. Resin: Epoxy.
 - b. Formulation Description: 100 percent solids.
 - c. Application Method: Varies by manufacturer. Apply by red rubber squeegee or spring-steel trowel.
 - 1) Apply to rough ground mortar coat to completely fill all voids.
 - 2) Thickness of coat: Verify thickness as systems vary by manufacturer; approximate range from a minimum of 8 to 10 mils

(0.2 to 0.25 mm) to a maximum of 400 to 500 square feet per gallon (140.65 to 175.81 square meters per liter).

4. Seal Coat/Top Coat:

- a. Resin: Single- or multi-component Urethane.
- b. Formulation Description: 100% solids. It must have a pH factor between 7 and 10 and must be a penetrating type specially prepared for use on terrazzo. It must not discolor or amber the terrazzo and must produce a slip resistant surface. Flash point of sealer must be a minimum of 80 degrees F (26 degrees C) when tested in accordance with ASTM D56.
- c. Application Method: Varies by manufacturer. Apply using notched squeegee and backroll or using a lambs wool applicator.
 - 1) Apply to fine ground mortar coat to completely fill all voids.
 - 2) Thickness of coat: Verify thickness as systems vary by manufacturer; approximate range from a minimum of 4 to 5 mils (0.1 to 0.13 mm) to a maximum of 500 to 750 square feet per gallon (175.81 to 263.74 square meters per liter).
 - 3) Number of coats: One.
- d. Aggregates: Verify inclusion of slip-retardant aggregates in seal coat/top coat.
- e. Textured Top Coat: Slip Resistant in accordance with UL 410.

D. System Characteristics:

- 1. Color and Pattern:
 - a. 37.5% Cameo Cream #0
 - b. 37.5% Canei Cream #1
 - c. 12.5% Rebel Gray #0
 - d. 12.5% Rebel Gray #1
 - e. 100% Terroxy #13-1P Mortar Gray
- 2. Integral cove base: 1 inch (25.4 mm) radius epoxy mortar cove keyed into concrete substrate. Verify cove base installation with manufacturer's system.
- 3. Overall System Thickness: Verify thickness as systems vary by manufacturer; approximate range from a minimum of 3/16 inch (4.76 mm) to a maximum of either 1/4 inch or 3/8 inch (6.35 mm or 9.5 mm).
- 4. Finish: 120 Grit, anti-slip resistant to meet or exceed 0.06 dry; 0.08 wet.

E. Physical Properties:

1. Conform to ASTM C722, Type A, Epoxy resin, and quartz aggregate.
2. Resilient Urethane Terrazzo products physical properties
3. Other physical properties of seamless troweled (quartz epoxy) resinous flooring system in addition to C722 when tested to be as follows:

Test	Property	Value
ASTM C109	Compressive Strength	4000 PSI
ASTM C307	Tensile Strength	800 PSI
ASTM D2240	Hardness Shore D	85/65
ASTM C413	Water Absorption	< 0.5%
ASTM C531	Thermal Coefficient of Linear Expansion	4.7 x 10 ⁻⁸
ASTM C579	Compressive Strength	6000 PSI
ASTM C580	Flexural	2000 to 4500 psi
ASTM D638	Tensile Strength	3000 psi
ASTM D790	Flexural Modulus	500000 psi
ASTM D2240 Shore D	Surface Hardness	80-90
ASTM D4060, CS-17	Abrasive Resistance	0<0.1 gm max weight loss
ASTM F1679	Co-efficient of Friction	Dry - 0.81 Wet - 0.56
Bond Strength	ASTM D7234	100% bond to concrete failure

F. Chemical Resistance in accordance ASTM D1308 - 02(2007) "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes". ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/D1308-02R07, www.astm.org. No effect to the following exposures:

1. Acetic acid (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. Waterproofing Membrane: Type recommended or produced by manufacturer of resinous (epoxy terrazzo) flooring for type of service and conditions as indicated in Drawings.
- B. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous floor coating.
- C. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc.
- D. Strips:
 1. Dividing strips "L" shaped as manufactured for use with resinous (Epoxy Terrazzo) flooring system.
 - a. White alloy zinc, 16 (1.518mm) gauge.
 - b. Plastic dividing strip may be used upon recommendation of material manufacturer only.
 2. Control Joint double "L" shaped strips as manufactured for use with resinous (Epoxy Terrazzo) flooring system. Position strips back to back.
 - a. White alloy zinc, 16 (1.518mm) gauge.
 - b. Plastic dividing strips may be used upon recommendation of material manufacturer only.
- E. Patching and Fill Material: Resinous product of or approved by resinous (Terrazzo) flooring manufacturer for application indicated.
- F. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.

2.3 BASE CAP STRIP

- A. Aluminum, Extruded:
- B. Shape for 3/16 inch (4.76 mm) depth of base material, "J" configuration.
- C. Finish:
 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
 2. Aluminum: NAAMM Amp 501:

- a. Clear anodic coating, AA-C22A41 chemically etched medium matte, with Architectural Class 1, 0.018 mm (0.7 mils) or thicker.
- D. Optional zinc strips can be used in some applications. Shape for 2mm, in "J" or "L" Configurations

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where resinous (epoxy terrazzo) flooring system with integral base is to be installed with the VA COR.
- B. Moisture Vapor Emission Testing: Perform moisture vapor transmission testing in accordance with ASTM F1869 to determine the MVER of the substrate prior to commencement of the work.
 - 1. MVT threshold for resinous (terrazzo) flooring must not exceed 3 pounds/1000 square feet in a 24 hour period.
 - 2. When MVT emission exceeds this limit, apply manufacturer's recommended vapor control primer or other corrective measures as recommended by manufacturer prior to application of flooring or membrane systems.
 - 3. Perform additional substrata preparation as recommended by resinous flooring manufacturer's technical representative to obtain satisfactory results of moisture vapor transmission testing prior to commencement of the work.
 - 4. Provide a written report showing test placement and results.

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) thereafter.
- B. Maintain relative humidity less than 85 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 must be reviewed with the VA COR for the resinous (terrazzo) flooring system with integral cove base.

B. Substrata must be approved by manufacture technical representative.

3.4 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Mechanically prepare substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM D4259 requirements, unless manufacturer's written instructions are more stringent.
 - 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 F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.
 - b. Perform maximum moisture-vapor-emission test, ASTM F 1869. Proceed with application only after substrates has obtained satisfactory results. If needed perform additional moisture tests until substrates pass testing.
 - 4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included

for flooring manufacturer recommended joint fill material, and concrete crack treatment.

F. Prepare wall to receive integral base:

1. Verify wall material is acceptable for resinous flooring application, if not, install material (e.g. cement board) to receive base.
2. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane, and/or crack isolation membrane) as recommended by resinous flooring manufacturer.
3. Grind, cut or sand protrusions to receive base application.

3.5 APPLICATION

A. General: Apply each component of resinous (epoxy terrazzo) flooring system with integral base according to manufacturer's directions to produce a uniform monolithic flooring surface of thickness indicated.

1. Verify that the substrate (dryness, pH level, etc.) is acceptable by the manufacturer's technical representative.
2. Use manufacturer recommended cleaning products.

B. Prepare substrate for resinous (terrazzo) flooring system:

1. Apply waterproof membrane as recommended by resinous flooring manufacturer at all vertical junctures and the entire flooring substrata. Embed fabric reinforcement into waterproof membrane liquid. Overlap all seams a minimum of 2 inches (51 mm).
2. Apply crack isolation membrane as recommended by resinous flooring manufacturer.
3. Apply substrata smoothing/patching underlayment as recommended by resinous flooring manufacturer.

C. Resinous (epoxy terrazzo) flooring system: Per manufacturer's written instructions. Based on the porosity of the substrata additional coats may be required:

1. Primer (Bond) Coat.
2. Strips: Set divider and control strips as indicated on plans. Strips must be set in a full bed of epoxy adhesive and allowed to cure before proceeding with the work.
3. Body Coat: Apply body coat (including aggregate) evenly over the primer (bond) coat to the desired thickness.
4. Power grind to expose aggregate.
5. Grout Coat.

6. Progressively fine grind and polish floor. Cleanse terrazzo with potable water and rinse. Remove excess rinse water and apply grout using identical Portland cement, color pigments as used in topping, ensuring to fill all voids. Cure Grout as recommended by manufacturer.
 - a. Grout may be left on terrazzo until all heavy and messy work in project is completed.
 - b. Fine grind until all grout is removed from surface.
 - c. Upon completion, terrazzo flooring must display a minimum of 70% of marble chips aggregate.
7. Cleaning: Wash all surfaces with a neutral cleaner. Rinse with clean water and allow surface to dry
8. Seal Coat (Top Coat). Apply sealing coats of type recommended by manufacturer to produce finish matching approved samples.
9. Cove base: Apply cove base mix to wall surfaces at locations shown to form cove base to form 4-inch (101 mm) cove base height. Follow manufacturer's instructions and details including taping, mixing, priming, troweling, grinding, polishing, and top-coating of cove base.
 - a. When wall surface is not concrete, concrete masonry unit, install cement board and/or exterior grade plywood at locations shown to form cove base.

3.6 TOLERANCE

- A. From line of plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base.
- B. From radius of cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

3.7 CURING, PROTECTION AND CLEANING

- A. Cure resinous terrazzo flooring in compliance with manufacturer's directions (during the application process), 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 (epoxy terrazzo) flooring materials from damage and wear during construction operation.
 1. Cover flooring with wax paper or Kraft paper.

Fargo VAHCS, Fargo ND
Perform Site Prep for SPS Equipment
2101 Elm Street North
Fargo, ND 58102

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Bid Documents

2. Cover paper with 1/4 inch (6.35 mm) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.
- D. Remove temporary covering and clean resinous (Epoxy Terrazzo) flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous (Epoxy Terrazzo) flooring manufacturer.

- - - E N D - - -

SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, but not limited to, the following:

1. Prime coats which may be applied in shop under other sections.
2. Prime painting unprimed surfaces to be painted under this Section.
3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
4. Painting ferrous metal (except stainless steel) exposed to view.
5. Painting galvanized ferrous metals exposed to view.
6. Painting interior concrete block exposed to view.
7. Painting gypsum drywall exposed to view.
8. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
9. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
10. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
11. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
12. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
13. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 RELATED WORK

- A. Section 01 35 26, SAFETY REQUIREMENTS: Activity Hazard Analysis.
- B. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- C. Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL: Lead Paint Removal.
- D. Division 05 METALS: Shop prime painting of steel and ferrous metals.
- E. Division 08 OPENINGS: Shop prime painting of steel and ferrous metals.
- F. Section 08 14 00, INTERIOR WOOD DOORS: Prefinished flush doors with transparent finishes.
- G. Section 09 96 00, HIGH PERFORMANCE RESINOUS WALL COATINGS (SC-1): Glazed wall surfacing or tile like coatings.
- H.
- I. Division 22 PLUMBING: Shop prime painting of steel and ferrous metals.
- J. Division 23 HEATING; VENTILATION AND AIR-CONDITIONING: Shop prime painting of steel and ferrous metals.
- K. Division 26 ELECTRICAL: Shop prime painting of steel and ferrous metals.
- L. Division 27 COMMUNICATIONS: Shop prime painting of steel and ferrous metals.
- M. Division 28 ELECTRONIC SAFETY AND SECURITY: Shop prime painting of steel and ferrous metals.
- N.

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 is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

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 in drawings.
 - 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.
4. Intumescent clear coating or fire-retardant paint.
5. Plastic floor coating.

1.4 **DELIVERY AND STORAGE**

A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
2. Product type.
3. Batch number.

4. Instructions for use.
5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
 1. Federal Specification Number, where applicable, and name of material.
 2. Surface upon which material is to be applied.
 3. 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 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 to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

1.6 **REGULATORY REQUIREMENTS**

- A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
 1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
 2. Lead-Base Paint:

- a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
 - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
 - c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
 - d. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
3. Asbestos: Provide materials that do not contain asbestos.
 4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
 5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
 6. Use high performance acrylic paints in place of alkyd paints.

1.7 SAFETY AND HEALTH

- A. Apply paint materials using safety methods and equipment in accordance with the following:
 1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.
- B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.
- C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
 1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
 2. 29 CFR 1910.1000.
 3. ACHIH-BKLT and ACGHI-DOC, threshold limit values.

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):
ACGIH TLV-BKLT-2012 Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC-2012 Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. ASME International (ASME):
A13.1-07(R2013) Scheme for the Identification of Piping Systems
- D. Code of Federal Regulation (CFR):
40 CFR 59 Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. Commercial Item Description (CID):
A-A-1272A Plaster Gypsum (Spackling Compound)
- F. Federal Specifications (Fed Spec):
TT-P-1411A Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)
- G. Master Painters Institute (MPI):
9 Exterior Alkyd Enamel MPI Gloss Level 6
21 Interior Latex Heat Retardant Coating, MPI Gloss Level 6
45 Interior Primer Sealer
46 Interior Enamel Undercoat
67 Interior Latex Fire Retardant, Top-Coat (ULC Approved)
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
- H. Society for Protective Coatings (SSPC):
SSPC SP 1-82(R2004) Solvent Cleaning
SSPC SP 2-82(R2004) Hand Tool Cleaning
SSPC SP 3-28(R2004) Power Tool Cleaning

SSPC SP 10/NACE No.2 ...Near-White Blast Cleaning

SSPC PA Guide 10 Guide to Safety and Health Requirements

I. Maple Flooring Manufacturer's Association (MFMA):

J. U.S. National Archives and Records Administration (NARA):

29 CFR 1910.1000 Air Contaminants

K. 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 gram/liter.
 2. Non-flat Paints and Coatings: 150 gram/liter.
 3. Dry-Fog Coatings: 400 gram/liter.
 4. Primers, Sealers, and Undercoaters: 200 gram/liter.
 5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 gram/liter.
 6. Zinc-Rich Industrial Maintenance Primers: 340 gram/liter.
 7. Pretreatment Wash Primers: 420 gram/liter.
 8. Shellacs, Clear: 730 gram/liter.
 9. Shellacs, Pigmented: 550 gram/liter.
- E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in

the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

2.3 BIOBASED CONTENT

- A. Paint products must comply with following bio-based standards for biobased materials:

Material Type	Percent by Weight
Interior Paint	20 percent biobased material
Interior Paint- Oil Based and Solvent Alkyd	67 percent biobased material
Exterior Paint	20 percent biobased material
Wood & Concrete Stain	39 percent biobased content
Polyurethane Coatings	25 percent biobased content
Water Tank Coatings	59 percent biobased content
Wood & Concrete Sealer-Membrane Concrete Sealers	11 percent biobased content
Wood & Concrete Sealer-Penetrating Liquid	79 percent biobased content

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

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
 2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.
- B. Atmospheric and Surface Conditions:
1. Do not apply coating when air or substrate conditions are:
 - a. Less than 3 degrees C (5 degrees F) above dew point.
 - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.

- c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- 2. Maintain interior temperatures until paint dries hard.
- 3. Do no exterior painting when it is windy and dusty.
- 4. Do not paint in direct sunlight or on surfaces that the sun will warm.
- 5. Apply only on clean, dry and frost-free surfaces except as follows:
 - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces only when allowed by manufacturer's printed instructions.
 - b. Concrete and masonry when permitted by manufacturer's recommendations, dampen surfaces to which water thinned acrylic and cementitious paints are applied with a fine mist of water on hot dry days to prevent excessive suction and to cool surface.
- 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 to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

- A. Application may be by brush or roller. Spray application only upon acceptance from the COR in writing.
- B. Furnish to the COR a painting schedule indicating when the respective coats of paint for the various areas and surfaces will be completed. This schedule is to be kept current as the job progresses.
- C. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.
- D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in

place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.

- E. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- F. Materials are to be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- G. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Government.
- H. All coats are to be dry to manufacturer's recommendations before applying succeeding coats.
- I. All suction spots or "hot spots" in plaster after the application of the first coat are to 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 must be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
- 2. See other sections of specifications for specified surface conditions and prime coat.
- 3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- 4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use

solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

- a. Concrete: 12 percent.
- b. Fiber-Cement Board: 12 percent.
- c. Masonry (Clay and CMU's): 12 percent.
- d. Wood: 15 percent.
- e. Gypsum Board: 12 percent.
- f. Plaster: 12 percent.

B. Fire Resistant Plywood:

- 1. Sand to a smooth even surface and then dust off.
- 2. Sand surfaces showing raised grain smooth between each coat.
- 3. Remove all dirt, grease, oil, wax, and other foreign matter with detergent.

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). Where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
- 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
 - a. Fill flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
- 4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
- 5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

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 Plaster and Gypsum Board:

1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.5 PAINT PREPARATION:

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two (2) component and two (2) 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 application 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 sterilizes and other recessed equipment and similar prefinished items.
- F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.7 PRIME PAINTING:

- A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.
- E. Metals except boilers, incinerator stacks, and engine exhaust pipes:
 - 1. Steel and iron: MPI 95 (Fast Drying Metal Primer).
 - 2. Zinc-coated steel and iron: MPI 107 (Rust Inhibitive Water Based Primer).
 - 3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
 - 4. Terne Metal: MPI 95 (Fast Drying Metal Primer).
 - 5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).

6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel).
7. Asphalt coated metal: MPI 1 (Aluminum Paint).
8. Metal over 94 degrees C (201 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating).

F. Gypsum Board:

1. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer), MPI 46 (Interior Enamel Undercoat) in shower and bathrooms.

3.8 EXTERIOR FINISHES:

- A. Apply following finish coats where specified in drawings.
- B. Steel and Ferrous Metal, Including Tern:
 1. Two (2) coats of MPI 9 (Exterior Alkyd Enamel) on exposed surfaces, except on surfaces over 94 degrees C (201 degrees F).

3.9 INTERIOR FINISHES:

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in drawings.

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 141 (Interior High Performance Latex, Gloss Level 5) unless specified otherwise.
 - b. Machinery: One (1) coat MPI 9 (Exterior Alkyd Enamel).
 - c. Asphalt Coated Metal: One (1) coat MPI 1 (Aluminum Paint).
 - d. Ferrous Metal over 94 degrees K (290 degrees F): Boilers, Incinerator Stacks, and Engine Exhaust Pipes: One (1) coat MPI 22 (High Heat Resistant Coating).

C. Gypsum Board:

1. Two (2) coats of MPI 139 (Interior High Performance Latex, MPI Gloss Level 3).

D. Masonry and Concrete Walls:

1. Over MPI 4 (Interior/Exterior Latex Block Filler) on CMU surfaces.
2. Two (2) coats of MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5).

3. Two (2) coats of MPI 141 (Interior High Performance Latex MPI Gloss Level 5).

E. Fire Resistant Plywood:

1. Paint Finish:

- a. One (1) coat of MPI 64 (Fire Retardant Coating, Latex, Interior, Flat) plus one (1) coat of MPI 21 (Heat Resistant Coating, MPI Gloss Level 6).

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. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- G. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.
- H. Sand or dull glossy surfaces prior to painting.
- I. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.11 PAINT COLOR:

- A. Color and gloss of finish coats is specified in drawings.
- 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 drawings, 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 drawings.
 2. Paint colors as specified in drawings:
 - 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 conduits containing fire alarm control wiring, and fire alarm equipment.
 - e. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.
 - f. Color to match brickwork sheet metal covering on breeching outside of exterior wall of boiler house.
- I. Apply paint systems on properly prepared and primed surface as follows:
- 1. Exterior Locations:
 - a. Apply two (2) coats of MPI 9 (Exterior Alkyd Enamel) to the following ferrous metal items:
Vent and exhaust pipes with temperatures under 94 degrees C (201 degrees F), roof drains, fire hydrants, post indicators, yard hydrants, exposed piping and similar items.
 - b. Apply two (2) coats of MPI 11 (Exterior Latex, Semi-Gloss) to galvanized and zinc-copper alloy metal.
 - c. Apply one (1) coat of MPI 22 (High Heat Resistant Coating), 650 degrees C (1200 degrees F) to incinerator stacks, boiler stacks, and engine generator exhaust.
 - 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, cast-iron radiators, electric conduits and panel boards.
 - 3. Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.

- b. Apply one (1) coat of MPI 50 (Interior Latex Primer Sealer) and one (1) coat of MPI 52 (Interior Latex, MPI Gloss Level 3) on finish of insulation on boiler breeching and uptakes inside boiler house, drums, drumheads, oil heaters, feed water heaters, tanks and piping.
 - c. Apply two (2) coats of MPI 22 (High Heat Resistant Coating) to ferrous metal surface over 94 degrees K (290 degrees F) of following items:
 - Garbage and trash incinerator.
 - Medical waste incinerator.
 - Exterior of boilers and ferrous metal in connection with boiler settings including supporting members, doors and door frames and fuel oil burning equipment.
 - Steam line flanges, bare pipe, fittings, valves, hangers and supports over 94 degrees K (290 degrees F).
 - Engine generator exhaust piping and muffler.
 - d. Paint electrical conduits containing cables rated 600 volts or more using two (2) coats of MPI 9 (Exterior Alkyd Enamel) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.
3. Other exposed locations:
- a. Metal surfaces, except aluminum, of cooling towers exposed to view, including connected pipes, rails, and ladders: Two (2) coats of MPI 1 (Aluminum Paint).
 - b. 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), MPI 119 (Exterior Latex, High Gloss (acrylic)).

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 of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
 - 2. Painting of ferrous metal and galvanized metal.
 - 3. Painting of wood with fire retardant paint exposed in attics, when used as mechanical equipment space (except shingles).
 - 4. Identity painting and safety painting.

B. Building and Structural Work not Painted:

1. Prefinished items:

- a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
- b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.

2. Finished surfaces:

- a. Hardware except ferrous metal.
- 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. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Face brick.
11. Structural steel encased in concrete, masonry, or other enclosure.
12. Structural steel to receive sprayed-on fire proofing.
13. Ceilings, walls, columns in interstitial spaces.
14. Ceilings, walls, and columns in pipe basements.

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.
 - d. Add Fuel oil grade numbers.
 6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off		Green	White	Blow-off
Boiler Feedwater		Green	White	Blr Feed
A/C Condenser Water				

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Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water				
Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Blue	White	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Green	White	H.P.
High Pressure Condensate				
Return		Green	White	H.P. Ret
Medium Pressure Steam		Green	White	M. P. Stm
Medium Pressure Condensate				
Return		Green	White	M.P. Ret
Low Pressure Steam		Green	White	L.P. Stm
Low Pressure Condensate				
Return		Green	White	L.P. Ret
High Temperature Water				
Supply		Green	White	H. Temp Wtr Sup
High Temperature Water				
Return		Green	White	H. Temp Wtr Ret
Hot Water Heating Supply		Green	White	H. W. Htg Sup
Hot Water Heating Return		Green	White	H. W. Htg Ret
Gravity Condensate Return		Green	White	Gravity Cond Ret
Pumped Condensate Return		Green	White	Pumped Cond Ret
Vacuum Condensate Return		Green	White	Vac Cond Ret
Boiler Water Sampling		Green	White	Sample
Chemical Feed		Green	White	Chem Feed
Continuous Blow-Down		Green	White	Cont. B D
Pumped Condensate		Green	White	Pump Cond
Pump Recirculating		Green	White	Pump-Recirc.
Vent Line		Green	White	Vent
Alkali		Orange	Black	Alk
Bleach		Orange	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr

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Ice Water

Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Orange	Black	Acid Waste
Vent		Orange	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6096 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000, 15000, or 25000.
8. See Sections for methods of identification, legends, and abbreviations of the following:
 - a. Regular compressed air lines: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
 - b. Dental compressed air lines: Section 22 61 13.74, DENTAL COMPRESSED-AIR PIPING / Section 22 61 19.74, DENTAL COMPRESSED-AIR EQUIPMENT.
 - c. 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.

- d. Oral evacuation lines: Section 22 62 19.74, DENTAL VACUUM AND EVACUATION EQUIPMENT.
 - e. 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.
 - f. 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 /
Section 28 05 28.33, CONDUITS AND BACKBOXES FOR ELECTRONIC SAFETY AND SECURITY.
- 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 09 96 00
HIGH PERFORMANCE RESINOUS WALL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. High-performance resinous wall and ceiling coating systems.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Installer Certificates for Qualification: Signed by manufacturer stating that installers comply with specified requirements.
- C. Material Certificates: For each resinous wall and ceiling component, from manufacturer.
- D. Maintenance Data: For maintenance manuals.
- E. Samples: Submit two 6" X 6" samples of each resinous wall and ceiling system applied to a rigid backing. Provide sample which is a true representation of proposed field applied finish. Provide sample color and texture for approval from Owner in writing or approved by General Contractor prior to installation.
- F. Product Schedule: For resinous wall and ceiling coating systems.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of wall and ceiling systems required for this Project.
 - 1. Engage an installer who is approved in writing by resinous wall and ceiling manufacturer as qualified to apply resinous wall and ceiling systems indicated.
 - 2. Installer Letter of Qualification: Installer to provide letter stating that they have been in business for at least 5 years and listing 5 projects in the last 2 years of similar scope. For each project provide: project name, location, date of installation, contact information, size of project, and manufacturer of materials with system information.
- B. Source Limitations: Obtain primary resinous wall and ceiling materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material,

joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

- C. Pre-installation Conference: Conduct conference at Project site before work and mockups begin.
- D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Do not cover up mockup area.
 - 1. Apply full-thickness mockups on 16 square foot floor area selected by Architect.
 - 2. Finish surfaces for verification of products, color, texture, and sheen.
 - 3. Simulate finished lighting conditions for Architect's review of mockups.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 5. Mockup must demonstrate desired slip resistance for review and approval by Owner's representative in writing.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous wall and ceiling manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous wall and ceiling application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
1. The Sherwin Williams Company, Cleveland, OH. Representative Contact: Michael Starner (484) 624-2360
michael.starner@sherwin.com .
- B. Basis of Design: ResuWall, 10-14 mils nominal thickness.
1. Primer: Resuflor Aqua 3479 at 300-350 sq. ft. per gallon.
 2. Base Coat (2 Coats @ 3-5 mils): Resuflor Aqua 3479 at 300-350 sq. ft. per gallon.
 3. Finish Coat: ResuTile 4410/4411 at 400-500 sq. ft. per gallon.

2.2 MATERIALS

- A. VOC Content of Resinous Wall and Ceiling Coating: Provide resinous wall and ceiling systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
1. Resinous Flooring: 100 g/L.

2.3 HIGH-PERFORMANCE RESINOUS WALL AND CEILING COATING SYSTEM

- A. Resinous Wall and Ceiling Coating: Abrasion-, impact- and chemical-resistant, high-performance, resin-based, monolithic floor surfacing designed to produce a seamless floor.
- B. System Characteristics:
1. Color and Pattern: As indicated from manufacturers listed above.
 2. Slip Resistance: Provide smooth, orange peel finish unless otherwise specified.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspection: Prior to commencing Work, thoroughly examine all underlying and adjoining work, surfaces and conditions upon which Work is in any way dependent for perfect results. Report all conditions which affect Work. No "waiver of responsibility" for incomplete, inadequate or defective underlaying and adjoining work, surfaces and conditions will be considered, unless notice of such unsatisfactory

conditions has been filed and agreed to in writing before Work begins.
Commencement of Work constitutes acceptance of surfaces.

- B. Surface Preparation: Remove all surface contamination, loose or weakly adherent particles, laitance, grease, oil, curing compounds, paint, dust and debris by blast track method or approved mechanical means (acid etch not allowed). If surface is questionable try a test patch. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile numbers as follows:

C. CONCRETE SURFACE PROFILE (CSP)

1. Thin film, to 10 mils	CSP-1 to CSP-3
2. Thin and medium films, 10 to 40 mils	CSP-3 to CSP-5
3. Self-leveling mortars, to 3/16"	CSP-4 to CSP-6
4. Mortars and laminates, to 1/4" or more	CSP-5 to CSP-10

- D. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests indicated below.

a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours. Perform tests so that each test area does not exceed 1000 sq. ft. and perform 3 tests for the first 1000 sq. ft. and one additional test for every additional 1000 sq ft.

b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.

3.2 ENVIRONMENTAL CONDITIONS

- A. All applicators and all other personnel in the area of the RF installation must take all required and necessary safety precautions. All manufacturers' installation instructions must be implicitly followed.
- B. Repair damaged and deteriorated concrete according to resinous wall and ceiling manufacturer's written instructions.

- C. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- D. Resinous Materials: Mix components and prepare materials according to resinous wall and ceiling manufacturer's written instructions.
- E. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous wall and ceiling according to manufacturer's written instructions.

3.3 APPLICATIONS

- A. Install resinous wall and ceiling coating system over properly prepared concrete surface in strict accordance with the manufacturer's directions.
 - 1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
 - 2. Install topcoat over wall and ceiling coating system after excess aggregate or sand dust has been removed.
 - 3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying wall and ceiling coatings, or as instructed by manufacturer.
- B. Apply components of resinous wall and ceiling 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 wall and ceiling system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous wall and ceiling components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. At substrate expansion and isolation joints, comply with resinous wall and ceiling manufacturer's written instructions.
- C. Sealant: Saw cut resinous wall and ceiling topping at expansion joints in concrete slab. Fill sawcuts with sealant prior to final seal coat application. Follow manufacturer's written recommendations.

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- D. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- E. Sand between coats and remove sand dust prior to next coat.
- F. Apply topcoats in number indicated for wall and ceiling system and at spreading rates recommended in writing by manufacturer.

3.4 COMPLETED WORK

- A. Cleaning: Upon completion of the Work, clean up and remove from the premises surplus materials, tools, appliances, empty cans, cartons and rubbish resulting from the Work. Clean off all spattering and drippings, and all resulting stains.
- B. Protection: Protect Work in accordance with manufacturer's directions from damage and wear during the remainder of the construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- C. Contractor must insure that coating is protected from any traffic until it is fully cured to the satisfaction of the coating manufacturer.

- - - END - - -

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior signage for room numbers, code required signs and temporary signs.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Division 26, ELECTRICAL Lighted EXIT signs for egress purposes are specified under Electrical Work.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide signage that is the product of one manufacturer, who has provided signage as specified for a minimum of three (3) years. Submit manufacturer's qualifications.
- B. 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.
- B. Sustainable Design Submittals, as described below:
1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- 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 maintenance instructions.
- E. Sign Location Plan, 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 site and mounting services are ready for installation work to proceed.
- D. Store products in dry condition inside enclosed facilities.

1.6 WARRANTY

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

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
 - 611-14 Anodized Architectural Aluminum
 - 2603-13 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
- C. American National Standards Institute (ANSI):
 - A117.1-09 Accessible and Usable Buildings and Facilities
- D. ASTM International (ASTM):
 - A36/A36M-19 Carbon Structural Steel
 - A240/A240M-20 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - A666-15 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

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- A1011/A1011M-18a Steel, Sheet and Strip, Hot-Rolled, Carbon,
Structural, High-Strength Low-Alloy, High-
Strength Low-Alloy with Improved Formability,
and Ultra-High Strength
- B36/B36M-18 Brass Plate, Sheet, Strip, and Rolled Bar
- B152/B152M-19 Copper Sheet, Strip, Plate, and Rolled Bar
- B209-14 Aluminum and Aluminum-Alloy Sheet and Plate
- B209M-14 Aluminum and Aluminum-Alloy Sheet and Plate
(Metric)
- 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)
- C1036-16 Flat Glass
- C1048-18 Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass
- C1349-17 Architectural Flat Glass Clad Polycarbonate
- D1003-13 Test Method for Haze and Luminous Transmittance
of Transparent Plastics
- D4802-16 Poly(Methyl Methacrylate) Acrylic Plastic Sheet
- E. Code of Federal Regulation (CFR):
- 40 CFR 59 Determination of Volatile Matter Content, Water
Content, Density Volume Solids, and Weight
Solids of Surface Coating
- F. Federal Specifications (Fed Spec):
- MIL-PRF-8184F Plastic Sheet, Acrylic, Modified.
- MIL-P-46144C Plastic Sheet, Polycarbonate
- G. National Fire Protection Association (NFPA):
- 70-14 National Electrical Code

PART 2 - PRODUCTS

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 graphics items as completed units produced by a single manufacturer, 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.

2.2 INTERIOR SIGN MATERIALS

- A. Aluminum:
 - 1. Sheet and Plate: ASTM B209M (B209).
 - 2. Extrusions and Tubing: ASTM B221M (B221).
- B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic must not be acceptable.
- C. Polycarbonate: MIL-P-46144C; Type I, class 1.
- D. Vinyl: Premium grade 0.1 mm (0.004 inch) thick machine cut, having a pressure sensitive adhesive and integral colors.
- E. Adhesives:
 - 1. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by signage manufacturer.
 - 2. Adhesives to have VOC content of 50 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).
- F. Typography: Comply with VA Signage Design Manual.
 - 1. Type Style: Helvetica Medium and Helvetica Medium Condensed. 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. Letter spacing: Comply with graphic standards in construction documents.
 - 5. Provide text, arrows, and symbols in size, colors, typefaces and letter spacing shown in construction documents. Text must be a true, clean, accurate reproduction of typeface(s). Text shown in construction documents is for layout purposes only; final text for signs is subject to approval by owner.

2.3 INTERIOR SIGN TYPES

- A. Conform to the VA Signage Design Manual and the Fargo VAHCS standard signage.
- B. Provide insert and frame component system.
- C. Temporary Interior Signs:
 - 1. Fabricated from 50 kg (110 pound) matte finished white paper cut to 101 mm (4 inch) wide by 305 mm (12 inch) long.
 - a. Punched 3.2 mm (.125 inch) hole with edge of hole spaced 13 mm (.5 inch) in from edge and centered on 101 mm (4 inch) side.
 - b. Reinforce hole on both sides with suitable material that prevents tie from pulling through hole.
 - c. Ties: Steel wire 0.3 mm (0.120 inch) thick attached to tag with twist leaving 152 mm (6 inch) long free ends.
 - 2. Mark architectural room number on sign, with broad felt marker in clearly legible numbers or letters that identify room, corridor or space as shown on construction documents.
 - 3. Install temporary signs to rooms that have a room, corridor or space number. Attach to door frame, door knob or door pull.
 - a. Doors that do not require signs are: corridor doors in corridor with same number, folding doors or partitions, toilet doors, bathroom doors within and between rooms, closet doors within rooms, communicating doors in partitions between rooms with corridor entrance doors.
 - b. Replace and missing, damaged or illegible signs.

2.4 FABRICATION

- A. Design interior signage components to allow for expansion and contraction for a minimum material temperature range of 38 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 curve 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 contract surfaces of connected members so joints will be tight and practically unnoticeable, without applying filling compound.

- E. Signs: Fabricate with fine, even texture to be flat and sound.
 - 1. Maintain lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern.
 - 2. Plane surfaces to 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 to be free from extrusion marks. Fabricate 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 sign message schedule and location review 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. Form joints exposed to weather to exclude water.
- K. Movable Parts, Including Hardware: Cleaned and adjusted to operate as designed without binding or deformation of members. Center doors and covers in opening or frame.
 - 1. Align contact surfaces fit tight and even without forcing or warping components.
- L. 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.
- M. Prime painted 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

3.1 INSTALLATION

- A. Locate signs as shown on the construction documents.
- B. Where not otherwise indicated conform to the VA Signage Design Manual for installation requirements.
- C. At each sign location there are no utility lines behind each sign location that will be affected by installation of signs.

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1. Correct and repair damage done to utilities during installation of signs at no additional cost to Government.
 - D. Provide inserts and anchoring devices which must be set in concrete or other material for installation of signs. Submit setting drawings, templates, instructions and directions for installation of anchorage devices, which may involve other trades.
 - E. Refer to drawings for mounting method. Mount signs in proper alignment, level and plumb according to the Sign Location Plan and the dimensions given on elevation and Sign Location Plans. When exact position, angle, height or location is not clear, contact COR for resolution.
 - 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.
- 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 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies wall guards, corner guards and and high impact wall covering.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS: Sustainable Design Requirements.
- B. Section 05 50 00, METAL FABRICATIONS: Structural Steel Corner Guards.
- C. Section 08 71 00, DOOR HARDWARE: Armor plates and kick plates not specified in this section.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer with a minimum of three (3) years' experience in providing items of type specified.
 - 1. Obtain wall and door protection from single manufacturer.
- 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. 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. Wall Guards.
 - 2. Corner Guards.
 - 3. 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 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 must warranty their wall and door protection for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.7 APPLICABLE PUBLICATIONS

- A. publications listed below form a part of this specification to extent referenced. publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - A240/A240M-20 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications
 - B221-14 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - B221M-13 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
 - D256-10(2018) Determining the Izod Pendulum Impact Resistance of Plastics
 - D635-18 Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
 - E84-20 Surface Burning Characteristics of Building Materials
- C. Aluminum Association (AA):
 - DAF 45-09 Designation System for Aluminum Finishes
- D. American Architectural Manufacturers Association (AAMA):
 - 611-14 Voluntary Specification for Anodized Architectural Aluminum
- E. Code of Federal Regulation (CFR):

40 CFR 59(2020) Subpart D National Volatile Organic Compound
Emission Standards for Architectural Coatings

F. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06 Metal Finishes Manual

G. National Fire Protection Association (NFPA):
80-2019 Standard for Fire Doors and Other Opening
Protectives

H. SAE International (SAE):
J 1545-2014-10 Instrumental Color Difference Measurement for
Exterior Finishes, Textiles and Colored Trim.

I. Underwriters Laboratories Inc. (UL):
Annual Issue Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: A240/A240M, Type 304.

B. Aluminum Extruded: ASTM B221M (B221), Alloy 6063, Temper T5 or T6.

C. 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 feet-pounds/square inch) when tested in accordance with ASTM D256 (Izod impact, feet-pounds per inch notched).
 - b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
 - c. Rated self-extinguishing when tested in accordance with ASTM D635.
 - d. Provide material labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
 - e. Provide resilient material for protection on fire rated doors and frames assemblies that is listed by the testing laboratory performing the tests.
 - f. Provide resilient material installed on fire rated wood/steel door and frame assemblies that have been tested on similar type assemblies. Test results of material tested on any other combination of door and frame assembly are not acceptable.

- g. 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

- A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type.
 - 1. Snap-on corner guard formed from resilient material, minimum 2 mm (0.080-inch) thick, free floating on a continuous 1.8 mm (0.070-inch) thick extruded aluminum retainer. Provide appropriate mounting hardware, cushions and base plates as required.
 - 2. Profile: Minimum 51 mm (2 inch) long leg and 6 mm (1/4 inch) corner radius.
 - 3. Height: full height.
 - 4. Retainer Clips: Provide manufacturer's standard impact-absorbing clips.
 - 5. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.
 - 6. Flush mounted corner guards installed on any fire rated wall to be installed in a manner that maintains the fire rating of the wall. Provide fire test of proposed corner guard system to verify compliance.
 - a. Where insulating materials are an integral part of the corner guard system, provide insulating materials furnished by the manufacturer of the corner guard system.

2.3 WALL GUARDS

- A. Resilient Wall Guards:
 - 1. Wall Guards:
 - a. Snap-on covers of resilient material, minimum 2 mm (0.080-inch) thick. Free-floating over 51 mm (2 inch) wide aluminum retainer clips, minimum 2 mm (0.080-inch) thick, anchored to wall at maximum 610 mm (24 inches) on center, supporting a continuous aluminum retainer, minimum 2.00 mm (0.080-inch) thick.
 - 2. Provide wall guards with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories as required. End caps and corners to be field adjustable to assure close alignment with handrails and wall guards. Screw or bolt closure caps to aluminum retainer in a concealed manner.

2.4 HIGH IMPACT WALL COVERING

- A. Provide wall covering/panels consisting of high impact rigid acrylic vinyl or polyvinyl chloride resilient material.
- B. Panel sizes to be 48 in x 120 in.
- C. Submit fire rating and extinguishing test results for resilient material.
- D. Submit statements attesting that the items comply with specified fire and safety code requirements.
- E. Rigid Vinyl Acrylic Wall Covering: Wall covering thickness to be 0.080 in.
- F. 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).
- G. Provide weld rods at seams as recommended by the wall covering manufacturer.

2.5 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.

2.6 FINISH

- A. Aluminum: In accordance with AA DAF-45.
 - 1. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.
- B. Stainless Steel: In accordance with NAAMM AMP 500 finish Number 4.
- C. Resilient Material: Embossed textures and color in accordance with SAE J1545.

PART 3 - INSTALLATION

3.1 RESILIENT CORNER GUARDS

- A. Install corner guards on walls in accordance with manufacturer's instructions.
- B. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow curing undisturbed for 24 hours.

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3.2 RESILIENT WALL GUARDS

- A. Secure guards to walls with fasteners in accordance with manufacturer's details and instructions.

3.3 HIGH IMPACT WALL COVERING

- A. Install wall covering in accordance with manufacturer's instructions.
- B. Heat weld seams and thermo-form corners.

- - - E N D - - -

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 areas indicated on drawings.

1.2 RELATED WORK

- A. Section 09 30 13, CERAMIC/PORCELAIN TILING: Ceramic Toilet and Bath Accessories.

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):
- D10.4-86(2000) Welding Austenitic Chromium-Nickle Stainless Steel Piping and Tubing.
- D. ASTM International (ASTM):
- A269/A269M-15a(2019) ...Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- A312/A312M-19 Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- A653/A653M-20 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- A666-15 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- A1011/A1011M-18a Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- B30-20 Copper Alloys in Ingot Form.
- B75/B75M-20 Seamless Copper Tube.
- B221-14 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

- B221M-13 Aluminum and Aluminum-Alloy Extruded Bars,
Rods, Wire, Profiles, and Tubes (Metric).
- B456-17 Electrodeposited Coatings of Copper Plus Nickel
Plus Chromium and Nickel Plus Chromium.
- B824-17 General Requirements for Copper Alloy Castings.
- C1036-16 Flat Glass.
- C1048-18 Heat-Strengthened and Fully Tempered Flat
Glass.
- D635-18 Rate of Burning and/or Extent and Time of
Burning of Plastics in a Horizontal Position.
- F446-19 Grab Bars and Accessories Installed in the
Bathing Area.
- E. Federal Specifications (Fed. Spec.):
- A-A-3002 Mirror, Glass.
- FF-S-107C(2) Screws, Tapping and Drive.
- WW-P-541/8B(1) Plumbing Fixtures (Accessories, Land Use).
- F. National Architectural Metal Manufacturers (NAAMM):
- 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 Data:
1. Description of each product.
 2. Installation instructions.
- D. Samples:
1. Full sized, complete assembly of each product specified.
 2. Approved samples may be incorporated into project.
- E. Certificates: Certify each product complies with specifications.
1. Soap dispensers: Certify soap dispensers are fabricated of material
that will not be affected by liquid soap, aseptic detergents, and
hexachlorophene solutions.
- F. Qualifications: Substantiate qualifications comply with specifications.
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, and for mirror doors in medicine cabinets.

2. ASTM C1036, Type 1 Class 1 Quality q3, for shelves in medicine cabinets.
3. ASTM C1048, Kind FT, Condition A, Type 1, Class 1 for glass and mirrors in Mental Health and Behavior Patient Care Units, and Security Examination Rooms.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: See drawings.
- B. Provide each product from one manufacturer.

2.3 PAPER TOWEL DISPENSERS

- A. Surface mounted type with sloping top.
- B. Dispensing capacity for 300 sheets of any type of paper toweling.
- C. Fabricate of stainless steel.
- D. Provide door with continuous hinge at bottom, and spring tension cam lock or tumbler lock, keyed alike, at top, and refill sight slot in front.

2.4 METAL FRAMED MIRRORS

- A. Fed. Spec. A-A-3002 metal frame; chromium finished 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.
4. Attached Shelf for Mirrors:
 - a. Fabricate shelf of same material and finish as mirror frame.
 - b. Make shelf maximum 150 mm (6 inches) in depth, and extend full width of mirror.
 - c. Close ends and front edge of shelf to same thickness as mirror frame width.
 - d. Form shelf for aluminum framed mirror as integral part of bottom frame member.

- e. Form stainless steel shelf with concealed brackets to attach to 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.

2.5 MOP RACKS

- A. Minimum 1016 mm (40 inches) long with five holders.

B. Clamps:

- 1. Minimum of 1.3 mm (0.05 inch) thick stainless steel bracket retaining channel with hard rubber serrated cam; pivot mounted to channel.
- 2. Clamps to hold handles from 13 mm (1/2 inch) minimum to 32 mm (1-1/4 inch) maximum diameter.

C. Support:

- 1. Minimum 1 mm (0.04 inch) thick stainless steel hat shape channel to hold clamps away from wall as indicated.
- 2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.

- D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.

2.6 STAINLESS STEEL SHELVES

A. Shelves:

- 1. Fabricate shelves of 1.2 mm (0.0478 inch) thick sheet to size and design indicated on Drawings.
- 2. Fabricate shelves of hollow metal type construction with closed fronts, backs, ends and bottoms. Reinforce shelves with 1.2 mm (0.05 inch) thick sheet steel hat channel stiffeners, full depth, welded to underside of top at bracket locations.
- 3. Miter cuts, where made at corners of shelves, continuously welding.

- B. Form brackets of 3 mm (1/8 inch) thick steel. Drill brackets for 6 mm (1/4 inch) anchor bolts.

C. Weld or Screw brackets to shelves.

2.7 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.

2.8 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. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.9 ACCESSORIES

- A. Fasteners:
 - 1. Fasteners in Mental Health and Behavioral Patient Care Units: Tamper resistant hot-dipped galvanized or stainless steel.
 - 2. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
 - 3. Concealed Fasteners:
 - a. Shower, Bath Tubs, and High Moisture Areas: Stainless steel.

- b. Other Locations: Steel, hot-dipped galvanized.
- 4. Toggle Bolts: For use in hollow masonry or frame construction.
- 5. Sex bolts: For through bolting on thin panels.
- 6. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
- 7. 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.
- C. Provide labor or prep as required for VA-furnished and contractor installed or VA-furnished and installed components.

3.2 INSTALLATION

- 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 grab bars according to ASTM F446.
- C. Set work accurately, in alignment and where indicated, parallel or perpendicular as required to line and plane of surface. Install accessories plumb, level, free of rack and twist.
- D. Toggle bolt to steel anchorage plates in frame partitions and hollow masonry. Expansion bolt to concrete or solid masonry.
- E. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.
- F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance.
- G. Align mirrors, dispensers and other accessories even and level, when installed in battery.

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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.

- - E N D - -

**SECTION 12 36 00
COUNTERTOPS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies casework countertops with integral accessories.
- B. Integral accessories include:
 - 1. Sinks with traps and drains.

1.2 RELATED WORK

- A. Section 07 92 00, JOINT SEALANTS: Sealants.
- B. Section 09 22 16, NON-STRUCTURAL METAL FRAMING: Backing Plates for Wall Mounted brackets.

1.3 SUBMITTALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings
 - 1. Show dimensions of section and method of assembly.
 - 2. Show details of construction at a scale of ½ inch to a foot.
- C. Samples:
 - 1. 150 mm (6 inch) square samples each top.
 - 2. Front edge, back splash, end splash and core with surface material and booking.

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 Hardboard Association (AHA):
 - A135.4-95 Basic Hardboard
- C. Composite Panel Association (CPA):
 - A208.1-09 Particleboard
- D. American Society of Mechanical Engineers (ASME):
 - A112.18.1-12 Plumbing Supply Fittings
 - A112.1.2-12 Air Gaps in Plumbing System
 - A112.19.3-08(R2004) Stainless Steel Plumbing Fixtures (Designed for Residential Use)
- E. American Society for Testing and Materials (ASTM):

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- A167-99 (R2009) Stainless and Heat-Resisting Chromium-Nickel
Steel Plate, Sheet and Strip
- A1008-10 Steel, Sheet, Cold-Rolled, Carbon, Structural,
High Strength, Low Alloy
- 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
- D790-10 Flexural Properties of Unreinforced and
Reinforced Plastics and Electrical Insulating
Materials
- D4690-99 (2005) Urea-Formaldehyde Resin Adhesives
- F. Federal Specifications (FS):
- A-A-1936 Adhesive, Contact, Neoprene Rubber
- G. U.S. Department of Commerce, Product Standards (PS):
- PS 1-95 Construction and Industrial Plywood
- H. National Electrical Manufacturers Association (NEMA):
- LD 3-05 High Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 MATERIALS

- C. Stainless Steel: ASTM A167, Type 316.
- D. Sheet Steel: ASTM A1008, cold rolled, Class 1 finish, stretcher leveled.
- E. Particleboard: CPA A208.1, Grade 2-M-2.
- F. Plywood: PS 1, Exterior type, veneer grade AC not less than five ply construction.
- H. Hardboard: ANSI/AHA A135.4, Type I, tempered, fire retardant treated, smooth surface one side.
- I. Adhesive
1. For plastic laminate FS A-A-1936.
 2. For wood products: ASTM D4690, unextended urea resin or unextended melamine resin, phenol resin, or resorcinol resin.
 3. For Field Joints:
 - a. Epoxy type, resistant to chemicals as specified for plastic laminate laboratory surfaces.
 - b. Fungi resistant: ASTM G-21, rating of 0.

J. Fasteners:

1. Metals used for welding same metal as materials joined.
2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.

2.3 TRAPS AND FITTINGS (NOT USED)

2.4 WATER FAUCETS (NOT USED)

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.
- D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
- E. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
- F. Fabricate with end splashes where against walls or cabinets, or as shown on drawings.
- 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.
 3. Laboratories and pharmacy heights or where fixtures or outlets occur: Not less than 150 mm (6 inches) unless noted otherwise.
 4. Fabricate epoxy splash back in maximum lengths practical of the same material.
- G. Metal Counter Tops:
 1. Fabricate up to 3600 mm (12 feet) long in one piece, including nosing, backs and ends.
 2. When counter tops exceed 3600 mm (12 feet) in length accurately fitted field joints are acceptable.
 3. Finish thickness at edges 32 mm (1-1/4 inch).

4. Reinforced with minimum 1.5 mm (0.0598 inch) thick hat channel stiffeners, minimum of two stiffeners welded to underside of top full length, except at sink openings.
5. Apply sound deadening material on underside.
6. Flange edges of tops down 32 mm (1-1/4 inch) and reinforce with concealed hardwood or with a steel frame.
7. Grind welds smooth and finished on exposed surfaces to match finish specified.
8. Stainless Steel Counter Tops:
 - a. Use 1.5 mm (0.0598 inch) thick stainless steel.
 - b. Depth of splash backs and splash ends 38 mm (1 1/2 inch) and turned down at least 32 mm (1 1/4 inch) at wall.
 - c. Reinforced with minimum 1.5 mm (0.0598 inch) thick hat channel stiffeners, minimum of two stiffeners welded to underside of top full length.
 - d. Apply NSF listed sound deadening material and marine grade plywood backing with laminate facing on underside.

H. Counter Brackets:

- a. Steel angles drilled for fasteners on 100 mm (4 inches) centers.
As shown on drawings. Spacing 3'-0" max OC.
- b. Baked enamel prime coat finish.

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.
 3. Use epoxy or silicone to fasten the epoxy resin countertops to the cabinets.

4. Use wood or sheet metal screws for wood or plastic laminate tops; minimum penetration into top 16 mm (5/8 inch), screw size No 8, or 10.

C. Rubber Moldings:

1. Where shown install molding with butt joints in horizontal runs and mitered joints at corners where ceramic tile occurs omit molding.
2. Fasten molding to wall and to splashbacks and splashends with adhesive.
2. Install molded resin sinks with epoxy compound to form watertight seal with underside of molded resin top.
 - a. Install sink with not less than two channel supports with threaded rods and nuts at each end, expansion bolted to molded resin top.
 - b. Design support for a twice the full sink weight.
 - c. Install with overflow standpipes.
3. Install methyl methacrylic polymer sinks in manufacturers 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.

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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