



CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO.: 438-420

SCHEMMER PROJECT NO.: 06054.034

100% CD SUBMITTAL
VOLUME 1
JUNE 2021

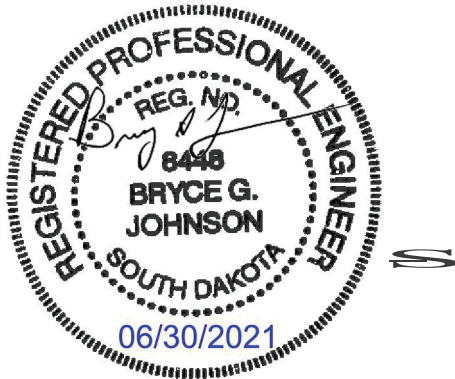
Prepared By:

SCHEMMER

Design with Purpose. Build with Confidence.

MECHANICAL

I hereby certify that this engineering document 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 South Dakota.



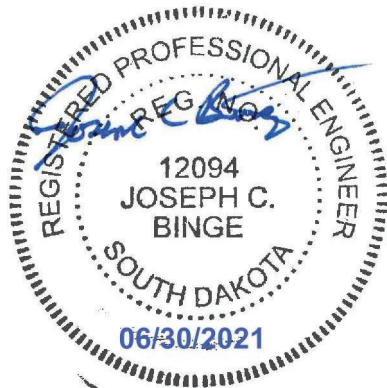
Bryce G. Johnson 12/31/2022
Printed or typed name License Renewal Date

fl. - I /J ----- 0613012021
_____ *at* _____

Pages or sheets covered by this seal: M-000, MC101, MC102, MH1 01, MP101, MS301, MS401, MS501, MS502, MS503, MS601 P-000, PL101, PL102, PL301, PS501, PS502 DIV 22000, DIV 23000

ELECTRICAL

I hereby certify that this engineering document 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 South Dakota.



Joseph Binge 5/31/2022
Printed or typed name License Renewal Date

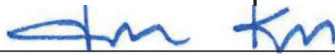
Joseph C Binge 06/30/2021
Signature Date

Pages or sheets covered by this seal: E-000, EC101, EC102, EC103, EL1 01, EL601, EP1 01, EP102, EP601, EP602, EY101, EY102, EY103, EY601, EY602, DIV 26000, DIV 27000, DIV 28000

ARCHITECTURAL

I hereby certify that this engineering document 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 South Dakota.



Daniel Kerns	10/31/2022
Printe or typed name	License Renewal Date
	06/30/2021
Signature	Date

Pages or sheets covered by this seal: ACCO1, ACC02, AOOO, AS100, ASI 01 , AS102, AS103, AS104, AS201, AS202, AS203, AS204, AS301, AS302, AS401, AS402, AS403, AS404, AS405, AS406, AS501, AS502, AS503, AS504, AS505, AS601, AS602, DIV 04, 05 50 00, 05 51 00, DIV 06, DIV 07, DIV 08, DIV 09, DIV 10, DIV 12

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

**DEPARTMENT OF VETERANS AFFAIRS
 VHA MASTER SPECIFICATIONS**

**TABLE OF CONTENTS
 Section 00 01 10**

VOLUME 1

	DIVISION 00 - SPECIAL SECTIONS	DATE
00 01 15	List of Drawing Sheets	06-30
	DIVISION 01 - GENERAL REQUIREMENTS	
01 00 00	General Requirements	06-30
01 32 16.15	Project Schedules (small Projects - Design/Bid/Build)	06-30
01 33 23	Shop Drawings, Product Data, and Samples	06-30
01 33 24	Electronic Submittal Procedures	06-30
01 35 26	Safety Requirements	06-30
01 42 19	Reference Standards	06-30
01 45 00	Quality Control	06-30
01 45 29	Testing laboratory services	06-30
01 57 19	Temporary Environmental Controls	06-30
01 58 16	Temporary Interior Signage	06-30
01 74 19	Construction Waste Management	06-30
01 91 00	General Commissioning Requirements	06-30
	DIVISION 02 - EXISTING CONDITIONS	
02 21 13	Site Surveys	06-30
02 41 00	Demolition	06-30
02 82 13.13	Glovebag Asbestos Abatement	06-30
	DIVISION 03 - CONCRETE	
03 30 00	Cast-in-Place Concrete	06-30
	DIVISION 04 - MASONRY	
04 05 13	Masonry Mortaring	06-30
04 05 16	Masonry Grouting	06-30
04 20 00	Unit Masonry	06-30
04 72 00	Cast Stone Masonry	06-30
	DIVISION 05 - METALS	
05 12 00	Structural Steel Framing	06-30
05 12 13	Architecturally Exposed Structural Steel	06-30
05 31 00	Steel Decking	06-30
05 40 00	Cold-Formed Metal Framing	06-30
05 50 00	Metal Fabrications	06-30
05 51 00	Metal Stairs	06-30

	DIVISION 06 - WOOD, PLASTICS AND COMPOSITES	
06 10 00	Rough Carpentry	06-30
	DIVISION 07 - THERMAL AND MOISTURE PROTECTION	
07 13 00	Sheet Waterproofing (Showers)	06-30
07 21 13	Thermal Insulation	06-30
07 22 00	Roof and Deck Insulation	06-30
07 27 27	Air & Vapor Barrier	06-30
07 31 14	Metal Shingles	06-30
07 53 23	Ethylene-Propylene-Diene-Monomer Roofing	06-30
07 60 00	Flashing and Sheet Metal	06-30
07 61 16	Standing Seam Metal Roofing	06-30
07 84 00	Firestopping	06-30
07 92 00	Joint Sealants	06-30
07 95 13	Expansion Joint Cover Assemblies	06-30
	DIVISION 08 - OPENINGS	
08 11 13	Hollow Metal Doors and Frames	06-30
08 14 00	Interior Wood Doors	06-30
08 41 13	Aluminum Entrances	06-30
08 44 13	Glazed Curtain Walls	06-30
08 71 00	Door Hardware	06-30
08 71 13	Automatic Door Operators	06-30
08 80 00	Glazing	06-30
	DIVISION 09 - FINISHES	
09 06 00	Schedule for Finishes	06-30
09 22 16	Non-Structural Metal Framing	06-30
09 29 00	Gypsum Board	06-30
09 30 13	Ceramic/Porcelain Tiling	06-30
09 51 00	Acoustical Ceilings	06-30
09 54 23	Linear Metal Ceilings	06-30
09 65 13	Resilient Base and Accessories	06-30
09 65 16	Resilient Sheet Flooring	06-30
09 65 19	Resilient Tile Flooring	06-30
09 91 00	Painting	06-30
	DIVISION 10 - SPECIALTIES	
10 26 00	Wall and Door Protection	06-30
10 28 00	Toilet, Bath, and Laundry Accessories	06-30
10 44 13	Fire Extinguisher Cabinets	06-30
	DIVISION 12 - FURNISHINGS	
12 24 00	Window Shades	06-30
12 32 00	Manufactured Wood Casework	06-30
12 36 00	Countertops	06-30

VOLUME 2		
	DIVISION 21- FIRE SUPPRESSION	
21 08 00	Commissioning of Fire Suppression System	06-30
21 13 13	Wet-Pipe Sprinkler Systems	06-30
	DIVISION 22 - PLUMBING	
22 05 11	Common Work Results for Plumbing	06-30
22 05 12	General Motor Requirements for Plumbing Equipment	06-30
22 05 19	Meters and Gages for Plumbing Piping	06-30
22 05 23	General-Duty Valves for Plumbing Piping	06-30
22 07 11	Plumbing Insulation	06-30
22 08 00	Commissioning of Plumbing Systems	06-30
22 11 00	Facility Water Distribution	06-30
22 11 23	Domestic Water Pumps	06-30
22 13 00	Facility Sanitary and Vent Piping	06-30
22 14 00	Facility Storm Drainage	06-30
22 35 00	Domestic Water Heat Exchangers	06-30
22 40 00	Plumbing Fixtures	06-30
22 42 26	Commercial Disposers	06-30
22 62 00	Vacuum Systems for Laboratory and Healthcare Facilities	06-30
22 63 00	Gas Systems for Laboratory and Healthcare Facilities	06-30
	DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)	
23 05 11	Common Work Results for HVAC	06-30
23 05 12	General Motor Requirements for HVAC and Steam Generation Equipment	06-30
23 05 41	Noise and Vibration Control for HVAC Piping and Equipment	06-30
23 05 93	Testing, Adjusting, and Balancing for HVAC	06-30
23 07 11	HVAC and Boiler Plant Insulation	06-30
23 08 00	Commissioning of HVAC Systems	06-30
23 09 23	Direct-Digital Control System for HVAC	06-30
23 21 13	Hydronic Piping	06-30
23 21 23	Hydronic Pumps	06-30
23 22 13	Steam and Condensate Heating Piping	06-30
23 23 00	Refrigerant Piping	06-30
23 25 00	HVAC Water Treatment	06-30
23 31 00	HVAC Ducts and Casings	06-30
23 34 00	HVAC Fans	06-30
23 36 00	Air Terminal Units	06-30
23 37 00	Air Outlets and Inlets	06-30
23 38 13	Commercial-Kitchen Hoods	06-30
23 40 00	HVAC Air Cleaning Devices	06-30
23 73 00	Indoor Central-Station Air-Handling Units	06-30
23 81 00	Decentralized Unitary HVAC Equipment	06-30

23 82 00	Convection Heating and Cooling Units	06-30
23 82 16	Air Coils	06-30
VOLUME 3		
DIVISION 26 - ELECTRICAL		
26 05 11	Requirements for Electrical Installations	06-30
26 05 13	Medium-Voltage Cables	06-30
26 05 19	Low-Voltage Electrical Power Conductors and Cables	06-30
26 05 26	Grounding and Bonding for Electrical Systems	06-30
26 05 33	Raceway and Boxes for Electrical Systems	06-30
26 05 41	Underground Electrical Construction	06-30
26 05 73	Overcurrent Protective Device Coordination Study	06-30
26 08 00	Commissioning of Electrical Systems	06-30
26 09 23	Lighting Controls	06-30
26 12 19	Pad-Mounted, Liquid-Filled, Medium-Voltage Transformers	06-30
26 24 16	Panelboards	06-30
26 26 00	Power Distribution Units for Static Uninterruptible Power Systems	06-30
26 27 26	Wiring Devices	06-30
26 29 11	Motor Controllers	06-30
26 29 21	Enclosed Switches and Circuit Breakers	06-30
26 41 00	Facility Lightning Protection	06-30
26 43 13	Surge Protective Device	06-30
26 51 00	Interior Lighting	06-30
26 56 00	Exterior Lighting	06-30
DIVISION 27 - COMMUNICATIONS		
27 05 11	Requirements for Communications Installations	06-30
27 05 26	Grounding and Bonding for Communications Systems	06-30
27 05 33	Raceways and Boxes for Communications Systems	06-30
27 08 00	Commissioning of Communications Systems	06-30
27 10 00	Control, Communication and Signal Wiring	06-30
27 11 00	Communications Equipment Room Fittings	06-30
27 15 00	Communications Structured Cabling	06-30
27 51 16	Public Address and Mass Notification Systems	06-30
27 52 23	Nurse Call and Code Blue Systems	06-30
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY		
28 05 00	Common Work Results for Electronic Safety and Security	06-30
28 05 13	Conductors and Cables for Electronic Safety and Security	06-30
28 05 28.33	Conduits and Backboxes for Electronic Safety and Security	06-30
28 08 00	Commissioning of Electronic Safety and Security Systems	06-30
28 13 00	Physical Access Control System	06-30
28 31 00	Fire Detection and Alarm	06-30

VOLUME 4		
	DIVISION 31 - EARTHWORK	
31 20 11	Earthwork (Short Form)	06-30
	DIVISION 32 - EXTERIOR IMPROVEMENTS	
32 05 23	Cement and Concrete for Exterior Improvements	06-30
32 17 23	Pavement Markings	06-30
32 31 40	High Security Gate	06-30
32 90 00	Planting	06-30
	DIVISION 33 - UTILITIES	
33 10 00	Water Utilities	06-30
33 30 00	Sanitary Sewer Utilities	06-30
33 40 00	Storm Sewer Utilities	06-30
33 63 00	Steam Energy Distribution	06-30
	APPENDICES	
	Structural Calculations	06-30
	Signed Envelope COMcheck Report	06-30
	Signed Mechanical COMcheck Report	06-30
	Signed Electrical COMcheck Report	06-30
	UL Designs	06-30
	Hydraulic Calculations - Area 1	06-30
	Hydraulic Calculations - Area 2	06-30
	Hydraulic Calculations - Area 3	06-30
	Hydraulic Calculations - Area 4	06-30
	CLC Cottage - Blast Design Narrative	06-30

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 00 01 15

LIST OF DRAWING SHEETS

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

DWG NO. TITLE

GENERAL

0 COVER SHEET
ACC01 ARCHITECTURAL CODE COMPLIANCE
ACC02 ARCHITECTURAL CODE COMPLIANCE

CIVIL

CD101 SITE GENERAL NOTES & SPECIFICATIONS
CD102 SITE DEMOLITION PLAN
CD103 SITE SURCHARGE PLAN
CG101 SITE EROSION CONSTROL, GRADING &
 STORM SEWER PLAN
CG102 SPOT ELEVATION PLAN
CG103 SPOT ELEVATION PLAN
CG104 UNDERGROUND STORMWATER STORAGE
CP101 SITE LAYOUT & PAVING PLAN
CS101 SITE DETAILS
CS102 SITE DETAILS
CS103 SITE DETAILS
CU101 SITE UTILITY PLAN
CU102 SITE UTILITY PROFILES
LP101 SITE LANDSCAPE PLAN

ARCHITECTURAL

A000 ARCHITECTURAL INFO SHEET
AS100 DEMOLITION & LOCATION PLAN
AS101 FIRST FLOOR PLAN, ENLARGED PLANS
AS102 FIRST FLOOR ENLARGED PLANS
AS103 MEZZANINE
AS104 ROOF PLAN
AS201 EXTERIOR BUILDING ELEVATIONS
AS202 EXTERIOR BUILDING ELEVATIONS & BUILDING SECTIONS
AS203 BUILDING SECTIONS

AS204 3D EXTERIOR VIEWS
AS301 DOOR SCHEDULE, ROOM FINISH SCHEDULE & EQUIPMENT SCHEDULE
AS302 DOOR AND FRAME TYPES AND WINDOW DETAILS
AS401 WALL SECTIONS & DETAILS
AS402 WALL SECTIONS
AS403 WALL SECTIONS
AS404 DETAILS
AS405 DETAILS
AS406 DETAILS
AS501 INTERIOR ELEVATIONS
AS502 INTERIOR ELEVATIONS
AS503 MILLWORK DETAILS
AS504 MILLWORK DETAILS
AS505 CORRIDOR ELEVATIONS
AS601 REFLECTED CEILING PLAN AND DETAILS
AS602 REFLECTED CEILING PLAN AND DETAILS

STRUCTURAL

S-000 STRUCTURAL INFO SHEET
S-001 STRUCTURAL NOTES
S-002 SPECIAL INSPECTIONS
SB101 FOUNDATION PLAN
SB501 TYPICAL FOUNDATION DETAILS
SB502 FOUNDATION DETAILS
SF101 ATTIC FRAMING PLAN
SF102 ROOF FRAMING PLAN
SF501 TYPICAL FRAMING DETAILS
SF502 FRAMING DETAILS
SF503 FRAMING DETAILS
SF504 FRAMING DETAILS
SF505 FRAMING DETAILS

FIRE PROTECTION

FA100 FIRST FLOOR - FIRE SPRINKLER PLAN
FA101 ATTIC - FIRE SPRINKLER PLAN
FA200 SITE FIRE PROTECTION PLAN, NOTES AND DETAILS

MECHANICAL

M-000 MECHANICAL INFO SHEET

MC101 SITE PLAN - MECHANICAL
MC102 BASEMENT FLOOR PLAN - BUILDING 1 & 5
MH101 FLOOR PLANS - HVAC
MP101 FLOOR PLANS - HVAC PIPING
MS301 MECHANICAL SECTIONS
MS401 MECHANICAL CONTROL SEQUENCE
MS501 MECHANICAL DETAILS
MS502 MECHANICAL DETAILS
MS503 MECHANICAL DETAILS
MS601 MECHANICAL SCHEDULES

PLUMBING

P-000 PLUMBING INFO SHEET
PL101 FLOOR PLANS - PLUMBING
PL102 FIRST FLOOR PLAN - PLUMBING - MEDICAL GAS
PL301 RISER DIAGRAMS
PS501 PLUMBING DETAILS
PS502 PLUMBING SCHEDULES & DETAILS

ELECTRICAL

E-000 ELECTRICAL INFO SHEET
EC101 SITE PLAN - ELECTRICAL DEMOLITION
EC102 SITE PLAN - ELECTRICAL
EC103 BASEMENT FLOOR PLAN - BUILDINGS 1 & 5/FIRST FLOOR PLAN - BUILDING 5
EL101 FIRST FLOOR PLAN/ATTIC FLOOR PLAN - LIGHTING
EL601 LIGHTING CONTROL DIAGRAMS
EP101 FIRST FLOOR PLAN/ATTIC FLOOR PLAN - POWER
EP102 ENLARGED FIRST FLOOR / ATTIC PLANS - POWER
EP601 EQUIPMENT & LUMINAIRE SCHEDULE
EP602 POWER RISER DIAGRAM & PANEL SCHEDULES
EY101 FIRST FLOOR PLAN/ATTIC FLOOR PLAN - AUXILIARY SYSTEMS
EY102 ENLARGED FIRST FLOOR PLAN/ATTIC FLOOR PLAN - AUXILIARY SYSTEMS
EY103 LIGHTNING PROTECTION PLAN
EY601 AUXILIARY SYSTEMS RISER DIAGRAMS
EY602 AUXILIARY SYSTEMS RISER DIAGRAMS & DETAILS

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures including electrical and HVAC for such project as required by drawings and specifications.
- B. Visits to the site by Bidders may be made in accordance with what is listed in the solicitation and at the discretion of the contracting officer.
- C. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.
- D. Prior to commencing work, general contractor shall provide proof that an OSHA certified "competent person" (CP) (29 CFR 1926.20(b)(2)) will maintain a presence at the work site whenever the general or subcontractors are present.
- E. Training:
 - 1. All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training, as determined by VA CP with input from the ICRA team.
 - 2. Submit training records of all such employees for approval before the start of work.
- F. The Key Personnel assigned by the contractor for the performance of work on this contract shall be acceptable to VA in terms of personal and professional conduct and technical knowledge. Should the assignment to this contract of any person by the contractor be deemed to conflict with the interests of VA, or in the event performance is deemed to be unsatisfactory at any time during the life of the contract, the Contracting Officer may notify the contractor and request the person be removed from the assignment. The reason for removal will be documented and a request to receive key personnel replacement within three (3) business days of the notification will be made. Replacement of key personnel qualifications shall be equal to or greater than those of the key personnel being replaced. Employment and staffing difficulties will not be justification for failure to meet established schedules. The

contractor is required to submit a resume with qualifications for the proposed replacement which shall be approved by the COR and CO prior to the replacement starting work.

- G. The construction of the CLC Hospice Cottage shall not have a delay for winter conditions including frozen ground or freezing temperatures. Contractors are expected phase work to meet the specifications requiring a certain temperature.
- H. The Sioux Falls VA campus has many construction projects being worked on. Contractors shall coordinate with the VA and other contractors for space and utilities.
- I. The project site is located next to a Veteran's memorial monument. Contractors are to protect the monument during construction and are responsible for any damage caused by the construction.

1.2 STATEMENT OF BID ITEM(S)

A. BID ITEM I (base bid):

General: This is a new 11,115 SF Hospice Cottage located on the north side of the VA Medical Center Campus. A connecting pedestrian walkway provides an enclosed, at-grade corridor for staff members between the Basement Level of Building 1 and the First Floor of the Hospice Cottage. Site and Building design elements have been made to comply with the Physical Security & Resiliency Design Manual, issued October 1, 2020. This facility is considered an LSP Facility.

Civil:

Site Phasing - There are several utilities that need to be relocated prior to grading and surcharge work. All services must remain in operating order for the duration of the project so some new

utilities will need to be installed and operational before the existing ones can be disconnected.

Site Grading - A surcharge will need to sit on the proposed building location for a minimum of 105 days or as required by the Geotechnical Report. Once the surcharge can be removed the site can be graded to the final grades. The surcharge soil will need to be hauled in and hauled back off. There is not enough site grading or area to borrow from the site itself.

Site Utilities - As already mentioned in Site Phasing, careful planning will need to go into the relocation, connection and disconnection of some utilities. All connections to utilities are fairly close to the proposed building location.

Site Work - The building is approached by the existing Circle Drive. New parking stalls will be placed along Circle Drive on the east side of the new building, while also having a secured access drive on the west side for screened vehicles.

Architectural: The floor plan consists of three different resident room layouts (one of which is a bariatric unit). Resident Rooms consist of a private Resident Room with private Resident Bath. Each Resident Room has a large window with window seat, along with casework at the footwall of the Resident Room; this casework consists of Resident storage, nurse cabinet, electric fireplace, TV, and second window seat. Handwashing sinks for nursing staff are located outside of each Resident Room (sometimes shared between two rooms). The Living/Dining is an open concept with tall vaulted ceilings and a fireplace (a shaft with electric fireplace and TV mounted to each side). Several outdoor patios and a screened porch allow Residents and their families to enjoy the outdoors (views overlook an existing memorial to the East).

Structural: The roof structure consists of light gauge steel trusses supported on a combination of structural steel framing and light gauge metal stud bearing walls. The roof includes enclosed mechanical space in the attic, with concrete on metal deck supported by structural steel framing. The remaining attic space has a fiber cement board walking surface. The substructure consists of shallow foundations such as grade beams, strip footings and spread footings. The structure is laterally supported by a combination of steel moment frames and light gauge metal stud shear walls.

Mechanical: All new HVAC systems include a central variable air volume air handling unit with terminal hot water reheat. The cooling source is an extension of the existing chilled water system with pipe distribution through new utility trenches and existing crawl spaces to the cooling coil in the new AHU. The heating source is steam which serves a preheat coil, humidifier, heating hot water heat exchangers, and the domestic hot water heat exchanger. Other systems include a residential kitchen hood with fire suppression and mini-split systems for redundant cooling of electrical and IT rooms. Site work includes an extension of high-pressure steam and chilled water to the building.

Plumbing: All new plumbing systems include water closets with flush valves, lavatories and sinks, and showers. Medical gas systems are located in each resident room with service from existing sources. The building will have a new domestic water service, new sanitary sewer service, and soft water from an existing source.

Electrical: A new medium voltage transformer and medium voltage cabling will be installed to connect the building to the campus MV electrical system. The medium voltage transformer will match existing campus units, allowing the transformer to be loop fed. Empty ducts will be stubbed out from the transformer to allow for future loop expansion. New sectionalizing cabinets will be provided to intercept campus medium voltage near Building 16.

- Site lighting circuits interfering with the building footprint will be re-routed.
- Existing abandoned / obsolete telecommunications cabling, conduits, and manholes will be removed, making way for a new communications "highway" servicing the North end of the campus.
- The normal service will be 120/208V delivered from a new medium voltage transformer. Normal power is backed-up by generator on the campus level. Emergency power will be delivered at 120/208V from an existing emergency distribution panel from Building 1.
- Backbone fiber and analog phone cabling will originate from Building 5 via a new communications duct bank for future expansion. CATV will originate from Building 1.
- All lighting shall be LED and controlled in accordance with the latest edition of ASHRAE 90.1.

- The fire alarm system will be an extension to the existing system located in Building 1. A new panel will be installed in the new building and connected to the existing system.
- The paging system will be an extension of the campus system with headend equipment located in Building 5.
- A new nurse call system will be installed as an extension to the existing system with headend equipment located in Building 5.
- A wander prevention system will be installed.
- A PACS will be installed as an extension to the existing campus PACS.
- Video surveillance will be installed and the campus system will be upsized as required to handle the project cameras plus future.

B. AFTER AWARD OF CONTRACT, electronic sets of specifications and drawings will be furnished.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

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

B. Security Procedures:

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

C. Key Control:

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

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.

1.5 FIRE SAFETY

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

1. American Society for Testing and Materials (ASTM):
E84-2008.....Surface Burning Characteristics of Building
Materials
2. National Fire Protection Association (NFPA):
10-2006.....Standard for Portable Fire Extinguishers
30-2007.....Flammable and Combustible Liquids Code
51B-2003.....Standard for Fire Prevention During Welding,
Cutting and Other Hot Work
70-2007.....National Electrical Code
241-2004.....Standard for Safeguarding Construction,
Alteration, and Demolition Operations
3. Occupational Safety and Health Administration (OSHA):
29 CFR 1926.....Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Project Engineer for review for

compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Project Engineer that individuals have undergone contractor's safety briefing.

- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:
 - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, $\frac{3}{4}$ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one (as appropriate for code)-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 Project Engineer.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Project Engineer.
- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Sprinklers: Install, test and activate new automatic sprinklers under Interim Life Safety provisions as described and validated by Project Engineer and paragraph L below.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Project Engineer. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Project Engineer.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Project Engineer.
- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Engineer. Obtain permits from facility Safety Specialist at least 0.5 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Project Engineer.
- P. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate

and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.
- S. If required, submit documentation to the Resident Engineer that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.6 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- D. Working space and space available for storing materials shall be as shown on the drawings.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.

- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Project Engineer where required by limited working space.
1. Do not store materials and equipment in other than assigned areas.
 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
 3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.
- G. Phasing: To insure such executions, Contractor shall furnish the Project Engineer with a schedule of approximate dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof.
- H. Building No. 1 will be occupied during performance of work but immediate areas of alterations will be vacated.
1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas, including office 224-1 and break-room 221-1, of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
 2. Immediate areas of alterations not mentioned in preceding Subparagraph 1 will be temporarily vacated while alterations are performed.
- I. Construction Fence: shall be installed around any exposed demolition or excavation as approved by the COTR.
- J. When a building is turned over to Contractor: Not applicable.

- K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Project Engineer.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Project Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
 2. Contractor shall submit a request to interrupt any such services to Project Engineer, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
 3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Project Engineer.
 5. In case of a contract construction emergency, service will be interrupted on approval of Project Engineer. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam,

payment of such fee shall be the responsibility of the Government and not the Contractor.

- L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
 - 1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever excavations for new utility lines cross existing roads, this constitutes a major interruption, and notification must be made at least 15 calendar days in advance.
 - 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Project Engineer.
- N. Coordinate the work for this contract with other construction operations as directed by Project Engineer. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.
- O. Any new or existing utility that is uncovered and/or exposed shall be physically located by survey. Contractor is responsible for providing coordinates (X,Y,Z) to the VA engineering department. All coordinates shall be in South Dakota state plains datum or by use of Sioux Falls VA existing control points.

1.7 ALTERATIONS

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

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

protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 INFECTION PREVENTION MEASURES

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Project Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
 - 1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. In addition:
 - 1. The Project Engineer and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.
 - 2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.
- D. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
 - 1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Project

Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.

2. Do not perform dust producing tasks within occupied areas without the approval of the Project Engineer. For construction in any areas that will remain jointly occupied by the Medical Center and Contractor's workers, the Contractor shall:
 - a. Provide dust proof fire-rated temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt, debris and dust. Barriers shall be sealed and made presentable on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Project Engineer and Medical Center.
 - b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.
 - c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
 - d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently.

Remove debris as they are created. Transport these outside the construction area in containers with tightly fitting lids.

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

E. Final Cleanup:

- 1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
- 2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
- 3. All new air ducts shall be cleaned prior to final inspection.

1.9 DISPOSAL AND RETENTION

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

- 1. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent

damage which would be detrimental to re-installation and reuse.

Store such items where directed by Project Engineer.

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

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

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

(FAR 52.236-9)

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

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

1.11 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Project Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Project Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of Section 00 72 00, GENERAL CONDITIONS.

1.12 PHYSICAL DATA

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

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by: Not applicable.

(FAR 52.236-4)

- B. Subsurface conditions have been developed by core borings and test pits. Logs of subsurface exploration are shown diagrammatically on drawings. Not applicable.
- C. A copy of the soil report will be made available for inspection by bidders upon request to the Engineering Officer at the VA Medical Center. Not applicable.
- D. Government does not guarantee that other materials will not be encountered nor that proportions, conditions or character of several materials will not vary from those indicated by explorations.

1.13 PROFESSIONAL SURVEYING SERVICES

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

1.14 LAYOUT OF WORK

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

(FAR 52.236-17)

- B. Establish and plainly mark center lines for each building 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, are in accordance with lines and elevations shown on contract drawings.
- C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:
1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Project Engineer before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.
- D. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the Resident Engineer before any major items of concrete work are placed. In addition, Contractor shall furnish to the Resident Engineer 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.
- 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 Resident Engineer.

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

1.15 AS-BUILT DRAWINGS

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

1.16 USE OF ROADWAYS

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

1.17 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

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

1. Permission to use each unit or system must be given by Project Engineer. If the equipment is not installed and maintained in accordance with the following provisions, the Project Engineer will withdraw permission for use of the equipment.
 2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
 3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
 4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
 5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
 6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

1.18 TEMPORARY USE OF EXISTING ELEVATORS

- A. Use of existing elevators for handling building materials and Contractor's personnel will be permitted subject to following provisions: Not applicable.

1.19 TEMPORARY TOILETS

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

1.20 AVAILABILITY AND USE OF UTILITY SERVICES

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

1.21 TESTS

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a complex 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.

- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.
- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.22 INSTRUCTIONS

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

every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Project Engineer and shall be considered concluded only when the Project Engineer is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Project Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.23 GOVERNMENT-FURNISHED PROPERTY

- A. The Government shall deliver to the Contractor, the Government-furnished property 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 shall be prepared to receive this equipment from Government and store or place such equipment.
- D. Notify Contracting Officer in writing, 60 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.
 - 1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.
 - 2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.
- E. Equipment furnished by the Government will be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e., couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to make the connection between the Government furnished equipment item and the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.

- F. Completely assemble and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.
- G. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer.

1.24 RELOCATED EQUIPMENT ITEMS

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

1.25 HISTORIC PRESERVATION

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

- - - E N D - - -

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

PART 1- GENERAL

1.1 DESCRIPTION:

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

1.2 CONTRACTOR'S REPRESENTATIVE:

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

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the COTR, within 10 days of bid acceptance. The qualification proposal shall include:
1. The name and address of the proposed consultant.
 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven

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

1.4 COMPUTER PRODUCED SCHEDULES

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

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

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

activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints.

Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

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

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

- C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- D. The Complete Project Schedule shall contain approximately all major work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.232 - //Article 70 Without NAS-CPM// //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) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

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

- a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
 - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor,

or building, for at least five trades who are performing major work under this contract.

3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
 4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.

2. The planned number of shifts per day.

3. The number of hours per shift.

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

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

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

1.8 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit an application and certificate for payment using the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.232 - //Arfor (PAYMENTS UNDER FIXED PRICE CONSTRUCTION). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

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

1.9 PAYMENT AND PROGRESS REPORTING

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

1. Actual start and/or finish dates for updated/completed activities/events.

2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 5. Completion percentage for all completed and partially completed activities/events.
 6. Logic and duration revisions required by this section of the specifications.
 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be

appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will**

require detailed record keeping for each of the manual progress payment updates.

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

1.10 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and

other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.

2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 3. The schedule does not represent the actual prosecution and progress of the project.
 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes, and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

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

calendar-dated schedule for the time period in question and all other relevant information.

- B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

- - - E N D - - -

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

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

refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
 - A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate (only physical samples will be considered. Photos, scans, or any electronic submission will not be reviewed). Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
 - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.

1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
 3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
 2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
 3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
 4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
 5. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
 6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
 7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
 5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

1-10. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be resubmitted for approval to

The Schemmer Associates

(Architect-Engineer)

Point of Contact:

Seth Shannon, AIA, GGP, LEED AP BD+C
sshannon@schemmer.com

Construction Administrator:

Ann Hirschfeld
ahirschfeld@schemmer.com

3100 SE Gateway Drive, Suite 200

Grimes, IA 50111

1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Resident Engineer.

1-12 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 21 calendar days for submittals.

E. VA review period is 21 calendar days for RFIs.

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

1. "Approved": authorizes the Contractor to proceed with the work covered.

2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.

3. "Disapproved, revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.

4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal

marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

**SECTION 01 33 24 ELECTRONIC
SUBMITTAL PROCEDURES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies requirements for provision and use of an electronic, web-based service for submittal and tracking of construction submittals for the Project.

1.2 REFERENCED DOCUMENTS

- A. Additional submittal requirements: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 SUMMARY:

- A. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
- B. Shop drawing and product data submittals shall be transmitted to Architect in electronic (PDF) format using a web-based service designed specifically for transmitting and tracking submittals between construction team members.
- C. The electronic submittal process is not intended for color samples, color charts, or physical material samples.

1.4 GENERAL DESCRIPTION OF PROCEDURES:

- A. Submittal Preparation - Contractor may use any or all of the following options:
 - 1. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via the submittal exchange website.
 - 2. Subcontractors and Suppliers provide paper submittals to General Contractor who electronically scans and converts to PDF format.
 - 3. Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.
- B. Contractor shall review, comment, and apply electronic stamp certifying that the submittal (as noted) complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions, and coordination of information with other parts of the work.
- C. Contractor shall transmit each submittal to Architect and Owner (simultaneously) using the web-based submittal exchange service.

- D. Architect / Engineer review comments will be made available on web-based submittal exchange service. Contractor shall receive email notice of completed review.
- E. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.

1.5 REQUIREMENTS AND RESPONSIBILITIES

- A. Submittal Exchange Service shall provide:
 - 1. Web-based tracking and approval system.
 - 2. Automated email notice for new submittals and reminders for submittals approaching the review deadline.
 - 3. Tracking and exchange of ITC/RFI/CO's and other similar document as well as product and equipment submittals.
 - 4. Means for tracking of the status such documents including whether they have been approved and released by the Owner.
 - 5. Organized storage of submittals that is accessible for review by the designated construction team members at any time.
 - 6. Submit a complete set of submittals on CD to the Owner at the end of the Project. Include all submittals included product submittals, shop drawings, ITC/RFI/CO's and other similar submittals.
- B. Contractor responsibilities:
 - 1. Contractor shall pay the cost of the service.
 - a. The cost of services shall be paid in full by the Contractor. Contractor shall include the full cost of the service and all related costs in their proposal.
 - b. Training in the use of the service by the team members shall be at the option of the Contractor and, if chosen, shall be paid by the Contractor.
 - 2. Contractor shall have or obtain required hardware and software:
Internet Service and Equipment Requirements:
 - a. Email address and Internet access at Contractor's main office.
 - b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.
 - 3. Contractor shall prepare or have prepared all required submittals in the PDF format required.
 - a. PDF files must be readable. As a general rule, a resolution of 300 dpi should be used.

- b. If the Architect can download more readable product data directly from the manufacturer's website than was submitted by the Contractor, the Architect shall reserve the right to reject the submittal.
- 4. Other responsibilities for submittals shall be as described in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
 - a. Color samples, color charts, or physical material samples shall be submitted as described in Section 01 33 23.

1.6 ACCEPTABLE SERVICES

- A. Service must be pre-approved by the Owner.
- B. The Contractor may submit any service meeting these requirements for approval.
- C. The following services have been pre-approved:
 - 1. Submittal Exchange: 1-800-714-0024; www.submittalexchange.com.

- - - END - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

**SECTION 01 35 26
SAFETY REQUIREMENTS**

TABLE OF CONTENTS

1.1	APPLICABLE PUBLICATIONS.....	3
1.2	DEFINITIONS.....	4
1.3	REGULATORY REQUIREMENTS.....	5
1.4	ACCIDENT PREVENTION PLAN (APP).....	6
1.5	ACTIVITY HAZARD ANALYSES (AHAs).....	10
1.6	PRECONSTRUCTION CONFERENCE.....	12
1.7	"SITE SAFETY AND HEALTH OFFICER" (SSHO) and "COMPETENT PERSON" (CP).....	12
1.8	TRAINING.....	13
1.9	INSPECTIONS.....	14
1.10	ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS.....	15
1.11	PERSONAL PROTECTIVE EQUIPMENT (PPE).....	16
1.12	INFECTION CONTROL.....	16
1.13	TUBERCULOSIS SCREENING.....	21
1.14	FIRE SAFETY.....	21
1.15	ELECTRICAL.....	24
1.16	FALL PROTECTION.....	25
1.17	SCAFFOLDS AND OTHER WORK PLATFORMS.....	26
1.18	EXCAVATION AND TRENCHES.....	26
1.19	CRANES.....	29
1.20	CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).....	29
1.21	CONFINED SPACE ENTRY.....	30
1.22	WELDING AND CUTTING.....	30
1.23	LADDERS.....	30
1.24	FLOOR & WALL OPENINGS.....	30

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 01 35 26
SAFETY REQUIREMENTS

1.1 APPLICABLE PUBLICATIONS:

- A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
- B. American Society of Safety Engineers (ASSE):
 - A10.1-2011.....Pre-Project & Pre-Task Safety and Health Planning
 - A10.34-2012.....Protection of the Public on or Adjacent to Construction Sites
 - A10.38-2013.....Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations
- C. American Society for Testing and Materials (ASTM):
 - E84-2013.....Surface Burning Characteristics of Building Materials
- D. The Facilities Guidelines Institute (FGI):
 - FGI Guidelines-2010Guidelines for Design and Construction of Healthcare Facilities
- E. National Fire Protection Association (NFPA):
 - 10-2013.....Standard for Portable Fire Extinguishers
 - 30-2012.....Flammable and Combustible Liquids Code
 - 51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
 - 70-2014.....National Electrical Code
 - 70B-2013.....Recommended Practice for Electrical Equipment Maintenance
 - 70E-2015Standard for Electrical Safety in the Workplace
 - 99-2012.....Health Care Facilities Code
 - 241-2013.....Standard for Safeguarding Construction, Alteration, and Demolition Operations
- F. The Joint Commission (TJC)
 - TJC ManualComprehensive Accreditation and Certification Manual
- G. U.S. Nuclear Regulatory Commission

- 10 CFR 20Standards for Protection Against Radiation
- H. U.S. Occupational Safety and Health Administration (OSHA):
 - 29 CFR 1904Reporting and Recording Injuries & Illnesses
 - 29 CFR 1910Safety and Health Regulations for General Industry
 - 29 CFR 1926Safety and Health Regulations for Construction Industry
 - CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directive 2005-007

1.2 DEFINITIONS:

- A. Critical Lift. A lift with the hoisted load exceeding 75% of the crane's maximum capacity; lifts made out of the view of the operator (blind picks); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts over occupied facilities, loads lifted close to power-lines, and lifts in high winds or where other adverse environmental conditions exist; and any lift which the crane operator believes is critical.
- B. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).
- C. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- D. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- E. Accident/Incident Criticality Categories:
 - No impact - near miss incidents that should be investigated but are not required to be reported to the VA;
 - Minor incident/impact - incidents that require first aid or result in minor equipment damage (less than \$5000). These incidents must be investigated but are not required to be reported to the VA;
 - Moderate incident/impact - Any work-related injury or illness that results in:

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

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

Major incident/impact - Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of contractors' activities. Or any incident which leads to major property damage (greater than \$20,000) and/or may generate publicity or high visibility. These incidents must be investigated and are required to be reported to the VA as soon as practical, but not later than 2 hours after the incident

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

1.3 REGULATORY REQUIREMENTS:

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

1.4 ACCIDENT PREVENTION PLAN (APP) :

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

B. The APP shall be prepared as follows:

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

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

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

g. SAFETY AND HEALTH INSPECTIONS.

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

h. ACCIDENT/INCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all Moderate and Major as well as all High Visibility Incidents. The APP shall include accident/incident investigation procedure and identify person(s) responsible to provide the following to the Resident Engineer and Facility Safety Officer or Contracting Officer Representative:

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

i. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational, patient, and public safety risks in site-specific

compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

- 1) Emergency response;
- 2) Contingency for severe weather;
- 3) Fire Prevention;
- 4) Medical Support;
- 5) Posting of emergency telephone numbers;
- 6) Prevention of alcohol and drug abuse;
- 7) Site sanitation (housekeeping, drinking water, toilets);
- 8) Night operations and lighting;
- 9) Hazard communication program;
- 10) Welding/Cutting "Hot" work;
- 11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
- 12) General Electrical Safety;
- 13) Hazardous energy control (Machine LOTO);
- 14) Site-Specific Fall Protection & Prevention;
- 15) Excavation/trenching;
- 16) Asbestos abatement;
- 17) Lead abatement;
- 18) Crane Critical lift;
- 19) Respiratory protection;
- 20) Health hazard control program;
- 21) Radiation Safety Program;
- 22) Abrasive blasting;
- 23) Heat/Cold Stress Monitoring;
- 24) Crystalline Silica Monitoring (Assessment);
- 25) Demolition plan (to include engineering survey);
- 26) Formwork and shoring erection and removal;
- 27) PreCast Concrete;
- 28) Public (Mandatory compliance with ANSI/ASSE A10.34-2012).

C. Submit the APP to the Resident Engineer, 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 conference for acceptance. Work cannot proceed without an accepted APP.

- D. Once accepted by the Resident Engineer, Facility Safety Officer or Contracting Officer Representative, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer in accordance with FAR Clause 52.236-13, *Accident Prevention*, until the matter has been rectified.
- E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Resident Engineer, project superintendent, facility Safety Officer and Contracting Officer Representative. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public and the environment.

1.5 ACTIVITY HAZARD ANALYSES (AHAS) :

- A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)
- B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- C. Work shall not begin until the AHA for the work activity has been accepted by the Resident Engineer, Facility Safety Officer or Contracting Officer Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
 - 1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State

- and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.
2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).
 - a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.
 - b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.
 3. Submit AHAs to the Resident Engineer, 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 for review at least 15 [] calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
 4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.
 5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the Resident Engineer, Facility Safety Officer or Contracting Officer Representative.

1.6 PRECONSTRUCTION CONFERENCE:

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

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

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in

accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

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

1.8 TRAINING:

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the Resident Engineer, 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 conference for acceptance.

- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Resident Engineer, 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) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
 - 1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
 - 2. The Resident Engineer, 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 Resident Engineer, Facility Safety Officer or Contracting Officer Representative within one week of the onsite inspection.

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

- A. The prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental property damage (both government and contractor) that occur on site. Notify the Resident Engineer, Facility Safety Officer or Contracting Officer Representative as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Resident Engineer, Facility Safety Officer or Contracting Officer Representative determine whether a government investigation will be conducted.
- B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162 (or equivalent), and provide the report to the Resident Engineer, Facility Safety Officer or Contracting Officer Representative within 5 calendar days of the accident. The Resident Engineer, Facility Safety Officer or Contracting Officer Representative will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Resident Engineer, Facility Safety Officer or Contracting Officer Representative monthly.
- D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month

will be provided to the Resident Engineer, Facility Safety Officer or Contracting Officer Representative monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Resident Engineer, Facility Safety Officer or Contracting Officer Representative as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE) :

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
 - 1. Hard Hats - unless written authorization is given by the Resident Engineer, 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 regulations.
 - 2. Safety glasses - unless written authorization is given by the Resident Engineer, 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 shall be worn by each person on site unless written authorization is given by the Resident Engineer, 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.

1.12 INFECTION CONTROL

- A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas.

Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.

- B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the Resident Engineer, Facility Safety Officer or Contracting Officer Representative before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the Resident Engineer. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is: **Class I (at addition); Class III (at Building 1)**, however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows:
1. Class I requirements:
 - a. During Construction Work:
 - 1) Notify the Resident Engineer, Facility Safety Officer or Contracting Officer Representative
 - 2) Execute work by methods to minimize raising dust from construction operations.
 - 3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.
 - b. Upon Completion:
 - 1) Clean work area upon completion of task
 - 2) Notify the Resident Engineer, Facility Safety Officer or Contracting Officer Representative
 3. Class III requirements:
 - a. During Construction Work:
 - 1) Obtain permit from the Resident Engineer, Facility Safety Officer or Contracting Officer Representative
 - 2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.

- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
- 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
- 5) Contain construction waste before transport in tightly covered containers.
- 6) Cover transport receptacles or carts. Tape covering unless solid lid.

b. Upon Completion:

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

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

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

- a. Class III (where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping
 - b. Class III - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
 - c. Class III - Seal all penetrations in existing barrier airtight
 - d. Class III - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris
 - f. Class III - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.
- D. Products and Materials:
1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes
 2. Barrier Doors: Self Closing One-hour 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: Hospital-approved disinfectant or equivalent product
 8. Portable Ceiling Access Module
- E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.

- F. A dust control program will be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- G. Medical center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
 2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
 3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
 4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
 5. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust.

- All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
 7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.
- I. Final Cleanup:
1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
 2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
 3. All new air ducts shall be cleaned prior to final inspection.
- J. Exterior Construction
1. Contractor shall verify that dust will not be introduced into the medical center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.
 2. Dust created from disturbance of soil such as from vehicle movement will be wetted with use of a water truck as necessary
 3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

1.13 TUBERCULOSIS SCREENING

NOT USED.

1.14 FIRE SAFETY

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Resident Engineer, 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. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
 - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, $\frac{3}{4}$ hour fire/smoke rated doors with self-closing devices.
 - 2. Install one-hour fire-rated temporary construction partitions to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
 - 3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Resident Engineer, Facility Safety Officer or Contracting Officer Representative.
- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Resident Engineer, Facility Safety Officer or Contracting Officer Representative.

- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- K. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Resident Engineer, Facility Safety Officer or Contracting Officer Representative. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Resident Engineer, Facility Safety Officer or Contracting Officer Representative.
- M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Resident Engineer and Facility Safety Office. Obtain permits from Resident Engineer or facility Safety Officer at least 8 hours in advance.
- N. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Resident Engineer, Facility Safety Officer or Contracting Officer Representative.
- O. 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.
- P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

1.15 ELECTRICAL

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.
- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Resident Engineer, Facility Safety Officer or 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 shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical

testing instruments or equipment appropriate for the environment in which they will be used.

3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the The Resident Engineer, 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 shall not begin until the AHA for the work activity and permit for energized work has been reviewed and accepted by the Resident Engineer, Facility Safety Officer or Contracting Officer Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
- E. Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125-volt, 15-, 20-, or 30-ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be implemented in accordance with NFPA 70E - 2015, Chapter 1, Article 110.4(C) (2)..

1.16 FALL PROTECTION

- A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.
 1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
 2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.
 3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f))

for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.

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

1.17 SCAFFOLDS AND OTHER WORK PLATFORMS

- A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.
- B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.
- C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
 1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.
 2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.
 3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
 4. Emergency descent devices shall not be used as working platforms.
- D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:
 1. The Competent Person's name and signature;
 2. Dates of initial and last inspections.
- E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft (6 m) in height, positive fall protection shall be used.

1.18 EXCAVATION AND TRENCHES

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

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

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

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

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetrometer will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5

- Tons/FT2 - Type C, 0.5 Tons/FT2 to 1.5 Tons/FT2 - Type B, greater than 1.5 Tons/FT2 - Type A without condition to reduce to Type B).
2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.
 3. Indication of the spoil pile being stored at least 2 feet from the edge of the excavation and safe access being provided within 25 feet of the workers.
 4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.
- C. As required by OSHA 29 CFR 1926.651(b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.
1. The planned dig site will be outlined/marked in white prior to locating the utilities.
 2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.
 3. 811 will be called two business days before digging on all local or State lands and public Right-of Ways.
 4. Digging will not commence until all known utilities are marked.
 5. Utility markings will be maintained
- D. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within 3 to 5 feet of identified underground utilities. Exploratory bar or other

detection equipment will be utilized as necessary to further identify the location of underground utilities.

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

1.19 CRANES

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
 - B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date.
 - C. A detailed lift plan for all lifts shall be submitted to the Resident Engineer and/or Facility Safety Officer 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document.
 - D. Crane operators shall not carry loads
 - 1. over the general public or VAMC personnel
2. over any occupied building unless
- a. the top two floors are vacated
 - b. or overhead protection with a design live load of 300 psf is provided

1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

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

1.21 CONFINED SPACE ENTRY

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

1.22 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Resident Engineer or Facility Safety Officer. Obtain permits from Resident Engineer or Facility Safety Officer at least 8 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

1.23 LADDERS

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

1.24 FLOOR & WALL OPENINGS

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

- B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements. Skylights located in floors or roofs are considered floor or roof hole/openings.
- C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.
 3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
 4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
 5. Workers are prohibited from standing/walking on skylights.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

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

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

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

AIA American Institute of Architects
<http://www.aia.org>

AISC American Institute of Steel Construction
<http://www.aisc.org>

AISI American Iron and Steel Institute
<http://www.steel.org>

AITC American Institute of Timber Construction
<http://www.aitc-glulam.org>

AMCA Air Movement and Control Association, Inc.
<http://www.amca.org>

ANLA American Nursery & Landscape Association
<http://www.anla.org>

ANSI American National Standards Institute, Inc.
<http://www.ansi.org>

APA The Engineered Wood Association
<http://www.apawood.org>

ARI Air-Conditioning and Refrigeration Institute
<http://www.ari.org>

ASAE American Society of Agricultural Engineers
<http://www.asae.org>

ASCE American Society of Civil Engineers
<http://www.asce.org>

ASHRAE American Society of Heating, Refrigerating, and
Air-Conditioning Engineers
<http://www.ashrae.org>

ASME American Society of Mechanical Engineers
<http://www.asme.org>

ASSE American Society of Sanitary Engineering
<http://www.asse-plumbing.org>

ASTM American Society for Testing and Materials
<http://www.astm.org>

AWI Architectural Woodwork Institute
<http://www.awinet.org>

AWS American Welding Society
<http://www.aws.org>

AWWA American Water Works Association
<http://www.awwa.org>

BHMA Builders Hardware Manufacturers Association
<http://www.buildershardware.com>

BIA Brick Institute of America
<http://www.bia.org>

CAGI Compressed Air and Gas Institute
<http://www.cagi.org>

CGA Compressed Gas Association, Inc.
<http://www.cganet.com>

CI The Chlorine Institute, Inc.
<http://www.chlorineinstitute.org>

CISCA Ceilings and Interior Systems Construction Association
<http://www.cisca.org>

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IPCEA Insulated Power Cable Engineers Association

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

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

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

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

NBS National Bureau of Standards
See - NIST

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

NEC National Electric Code
See - NFPA National Fire Protection Association

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RIS Redwood Inspection Service
See - CRA

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

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

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

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

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

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

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

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

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

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

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

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

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

UBC The Uniform Building Code
See ICBO

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

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

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

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

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

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

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) projects.

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 shall 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 notice to Proceed proposed to implement the requirements of the FAR Clause 52.246.12 titled "Inspection of Construction". Design and/or construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an Interim plan applicable to the particular feature of work to be started. Work outside of the accepted Interim CQC Plan will not be permitted to begin until acceptance of a CQC Plan or another Interim CQC Plan containing the additional work scope is accepted.
- B. Content of the CQC Plan: Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record consultants, architects/engineers (A/E), fabricators, suppliers, and purchasing agents:
 1. A description of the QC organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three-phase control system for all aspects of the work

specified. Include a CQC System Manager that reports to the project superintendent.

2. The name, qualifications (in resume format) duties, responsibilities, and authorities of each person assigned a CQC function.
3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will to the Contracting Officer or Authorized designee. be issued by the CQC System Manager. Furnish copies of these letters.
4. Procedures for scheduling, reviewing, certifying, and managing submittals including those of subcontractors, designers of record, consultants, A/E's offsite fabricators, suppliers and purchasing agents. These procedures must be in accordance with Section 01 33 23 Shop Drawings, Product Data, and Samples.
5. Control, verification, and acceptance of testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer or Authorized designee are required to be used)
6. Procedures for tracking Preparatory, Initial, and Follow-Up control phases and control, verification, and acceptance tests including documentation.
7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
8. Reporting procedures, including proposed reporting formats.
9. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of specifications can generally

be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Coordination meeting.

10. Coordinate schedule work with Special Inspections required by Section 01 45 35 Special Inspections, the Statement of Special Inspections and Schedule of Special Inspections. Where the applicable Code issue by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the CQC Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the CQC Plan.

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

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

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

3.3 COORDINATION MEETING:

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 shall satisfy the requirements of Specification 01 35 26 Safety Requirements and reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer or Authorized designee. Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawings submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Government.
- B. **CQC System Manager:** Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC system Manager or SRE is required to be a PM or SRE to determine qualifications based on project complexity at construction review. This CQC System manager is on the site at all times during construction and is employed by the General Contractor. The CQC System Manger is assigned as CQC System Manager but has duties as project superintendent in addition to quality control. 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 employees of the prime or subcontractor; 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 can perform other duties but need to be allowed sufficient time to perform the specialized personnel's assigned quality controls duties as described in the CQC Plan. 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.
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.

Area	Qualifications
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	Licensed 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.

1. 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%20quality%20control%20reports.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
- D. American Society for Testing and Materials (ASTM):
 - A370-12.....Standard Test Methods and Definitions for Mechanical Testing of Steel Products

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- D422-63(2007).....Standard Test Method for Particle-Size Analysis
of Soils
- D698-07e1.....Standard Test Methods for Laboratory Compaction
Characteristics of Soil Using Standard Effort
- D1140-00(2006).....Standard Test Methods for Amount of Material in
Soils Finer than No. 200 Sieve
- D1143/D1143M-07e1.....Standard Test Methods for Deep Foundations
Under Static Axial Compressive Load
- D1188-07e1.....Standard Test Method for Bulk Specific Gravity
and Density of Compacted Bituminous Mixtures
Using Coated Samples
- D1556-07.....Standard Test Method for Density and Unit
Weight of Soil in Place by the Sand-Cone Method
- D1557-09.....Standard Test Methods for Laboratory Compaction
Characteristics of Soil Using Modified Effort
(56,000ft lbf/ft³ (2,700 KNm/m³))
- D2166-06.....Standard Test Method for Unconfined Compressive
Strength of Cohesive Soil
- D2167-08).....Standard Test Method for Density and Unit
Weight of Soil in Place by the Rubber Balloon
Method
- D2216-10.....Standard Test Methods for Laboratory
Determination of Water (Moisture) Content of
Soil and Rock by Mass
- D2974-07a.....Standard Test Methods for Moisture, Ash, and
Organic Matter of Peat and Other Organic Soils
- D3666-11.....Standard Specification for Minimum Requirements
for Agencies Testing and Inspecting Road and
Paving Materials
- D3740-11.....Standard Practice for Minimum Requirements for
Agencies Engaged in Testing and/or Inspection
of Soil and Rock as used in Engineering Design
and Construction
- D6938-10.....Standard Test Method for In-Place Density and
Water Content of Soil and Soil-Aggregate by
Nuclear Methods (Shallow Depth)
- E94-04(2010).....Standard Guide for Radiographic Examination

- E164-08.....Standard Practice for Contact Ultrasonic Testing of Weldments
- E329-11c.....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing
- E605-93 (R2011).....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members
- E709-08.....Standard Guide for Magnetic Particle Examination
- E1155-96 (R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers
- F3125/F3125M-15.....Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

E. American Welding Society (AWS):

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

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.

- C. Written Reports: Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Resident Engineer immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:
 - 1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Resident Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Resident Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 - 2. Provide full time observation of fill placement and compaction and field density testing in building areas and provide full time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
 - 3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.
- B. Testing Compaction:
 - 1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698 and/or ASTM D1557.
 - 2. Make field density tests in accordance with the primary testing method following ASTM D6938 wherever possible. Field density tests utilizing ASTM D1556 shall be utilized on a case by case basis only if there are problems with the validity of the results from the

primary method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Resident Engineer 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 Resident Engineer. 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 100 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C136.
- 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 Resident Engineer.

3.4 LANDSCAPING:

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
 - 1. Test for organic material by using ASTM D2974.
 - 2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.
- B. Submit laboratory test report of topsoil to Resident Engineer.

3.5 ASPHALT CONCRETE PAVING:

- A. Aggregate Base Course:
 - 1. Determine maximum density and optimum moisture content for aggregate base material in accordance with ASTM D1557, Method D.
 - 2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with ASTM D1556.
 - 3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.
- B. Asphalt Concrete:
 - 1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
 - 2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
 - 3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

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 Resident Engineer with concurrence of

- Contracting Officer and perform periodic inspections thereafter as determined by Resident Engineer.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Resident Engineer.
 3. Sample and test mix ingredients as necessary to insure compliance with specifications.
 4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
 5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.
- B. Field Inspection and Materials Testing:
1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
 2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.
 3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 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 Resident Engineer 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. Resident Engineer 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 Resident Engineer 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 Resident Engineer. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling,

- molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
 3. Furnish certified compression test reports (duplicate) to Resident Engineer. 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.

3.10 SHOTCRETE:

- A. Inspection and Material Testing:
 1. Provide field inspection and testing service as required by Resident Engineer to certify that shotcrete has been applied in accordance with contract documents.
 2. Periodically inspect and test proportioning equipment for accuracy and report deficiencies to Resident Engineer.
 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. Report instances of excessive moisture to Resident Engineer.
 5. Certify, in duplicate, that ingredients and proportions and amounts of ingredients in shotcrete conform to approved trial mixes.
 6. Provide field inspection of the proper size and placement of the reinforcement in the shotcrete.

B. Shotcrete Sampling:

1. Provide a technician at site of placement to perform shotcrete sampling.
2. Take cores in accordance with ACI 506.
3. Insure maintenance of water-cement ratio established by approved trial mix.
4. Verify specified mixing has been accomplished.

C. Laboratory Tests of Field Sample Panels:

1. Compression test core for strength in accordance with ACI 506. For each test series of three cores, test one core at 7 days and one core at 28 days. Use remaining core as a spare to be tested at either 7 or 28 days as required. Compile laboratory test reports as follows: Compressive strength test shall be result of one core, except when one core shows evidence of improper sampling or testing, in which case it shall be discarded and strength of spare core shall be used.
2. Submit certified compression test reports (duplicate) to Resident Engineer. On test report, indicate following information:
 - a. Core identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Compressive strength of shotcrete in MPa (psi).
 - d. Weather conditions during placing.
 - e. Temperature of shotcrete in each test core when test core was taken.
 - f. Maximum and minimum ambient temperature during placing.
 - g. Ambient temperature when shotcrete sample was taken.
 - h. Date delivered to laboratory and date tested.

- D. Submit inspection reports certification and instances of noncompliance to Resident Engineer.

3.11 PRESTRESSED CONCRETE:

- A. Inspection at Plant: Forms, placement and concrete cover of reinforcing steel and tendons, placement and finishing of concrete, and tensioning of tendons.
- B. Concrete Testing: Test concrete including materials for concrete required in Article, CONCRETE of this section, except make two test cylinders for each day's production of each strength of concrete produced.

- C. Test tendons for conformance with ASTM A416 and furnish report to Resident Engineer.
- D. Inspect members to insure that specification requirements for curing and finishes have been met.

3.12 ARCHITECTURAL PRECAST CONCRETE:

- A. Inspection at Plant: Forms, placement of reinforcing steel, concrete cover, and placement and finishing of concrete.
- B. Concrete Testing: Test concrete including materials for concrete as required in Article CONCRETE of this section, except make two test cylinders for each day's production of each strength of concrete produced.
- C. Inspect members to insure specification requirements for curing and finishes have been met.

3.13 MASONRY:

- A. Mortar Tests:
 - 1. Laboratory compressive strength test:
 - a. Comply with ASTM C780.
 - b. Obtain samples during or immediately after discharge from batch mixer.
 - c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
 - d. Test one sample at 7 days and 2 samples at 28 days.
 - 2. Two tests during first week of operation; one test per week after initial test until masonry completion.
- B. Grout Tests:
 - 1. Laboratory compressive strength test:
 - a. Comply with ASTM C1019.
 - b. Test one sample at 7 days and 2 samples at 28 days.
 - c. Perform test for each 230 m² (2500 square feet) of masonry.
- C. Masonry Unit Tests:
 - 1. Laboratory Compressive Strength Test:
 - a. Comply with ASTM C140.
 - b. Test 3 samples for each 460 m² (5000 square feet) of wall area.
- D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 m² (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

3.14 STRUCTURAL STEEL:

- A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Welding shall conform to AWS D1.1 Structural Welding Code.
- B. Prefabrication Inspection:
 - 1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
 - 2. Approve welding procedure qualifications either by pre-qualification or by witnessing qualifications tests.
 - 3. Approve welder qualifications by certification or retesting.
 - 4. Approve procedure for control of distortion and shrinkage stresses.
 - 5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.
- C. Fabrication and Erection:
 - 1. Weld Inspection:
 - a. Inspect welding equipment for capacity, maintenance and working condition.
 - b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
 - c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
 - d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
 - e. Measure 25 percent of fillet welds.
 - f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
 - 1) 20 percent of all shear plate fillet welds at random, final pass only.
 - 2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
 - 3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
 - 4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
 - 5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.

- g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.
 - h. Welding Radiographic Testing: Test in accordance with ASTM E94, and AWS D1.1 for 5 percent of all full penetration welds at random.
 - i. Verify that correction of rejected welds are made in accordance with AWS D1.1.
 - j. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.
2. Bolt Inspection:
- a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM F3125 Bolts.
 - b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM F3125 Bolts. Inspect all bolts in connection when one or more are rejected.
 - c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM F3125 Bolts. Inspect all bolts in connection when one or more are rejected.
 - d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
 - e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.
 - f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.
- D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to Resident Engineer.

3.15 STEEL DECKING:

- A. Provide field inspection of welds of metal deck to the supporting steel, and testing services to insure steel decking has been installed in accordance with contract documents and manufacturer's requirements.
- B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS D1.1. Refer to the "Plug Weld Qualification Procedure" in Part 3 "Field Quality Control."
- C. Submit inspection reports, certification, and instances of noncompliance to Resident Engineer.

3.16 SHEAR CONNECTOR STUDS:

- A. Provide field inspection and testing services required by AWS D.1 to insure shear connector studs have been installed in accordance with contract documents.
- B. Tests: Test 20 percent of headed studs for fastening strength in accordance with AWS D1.1.
- C. Submit inspection reports, certification, and instances of noncompliance to Resident Engineer.

3.17 SPRAYED-ON FIREPROOFING:

- A. Provide field inspection and testing services to certify sprayed-on fireproofing has been applied in accordance with contract documents.
- B. Obtain a copy of approved submittals from Resident Engineer.
- C. Use approved installation in test areas as criteria for inspection of work.
- D. Test sprayed-on fireproofing for thickness and density in accordance with ASTM E605.
 - 1. Thickness gauge specified in ASTM E605 may be modified for pole extension so that overhead sprayed material can be reached from floor.
- E. Location of test areas for field tests as follows:
 - 1. Thickness: Select one bay per floor, or one bay for each 930 m² (10,000 square feet) of floor area, whichever provides for greater number of tests. Take thickness determinations from each of following locations: Metal deck, beam, and column.
 - 2. Density: Take density determinations from each floor, or one test from each 930 m² (10,000 square feet) of floor area, whichever

- provides for greater number of tests, from each of the following areas: Underside of metal deck, beam flanges, and beam web.
- F. Submit inspection reports, certification, and instances of noncompliance to Resident Engineer.

3.18 TYPE OF TEST:

Approximate Number of Tests Required

A. Earthwork:

Laboratory Compaction Test, Soils:

//(AASHTO T180)//(AASHTO T99)//(ASTM D1557)//(ASTM D698)//

Field Density, Soils (AASHTO T191, T205, or T310)

Penetration Test, Soils

B. Landscaping:

Topsoil Test

C. Aggregate Base:

Laboratory Compaction, //(AASHTO T180)// //(ASTM D1557)//

Field Density, //(AASHTO T191)// //(ASTM D1556)//

Aggregate, Base Course Gradation (AASHTO T27)

Wear (AASHTO T96)

Soundness (AASHTO T104)

D. Asphalt Concrete:

Field Density, (AASHTO T230)//ASTM D1188//

Aggregate, Asphalt Concrete Gradation (AASHTO T27)

Wear (AASHTO T96)

Soundness (AASHTO T104)

E. Concrete:

Making and Curing Concrete Test Cylinders (ASTM C31)

Compressive Strength, Test Cylinders (ASTM C39)

Concrete Slump Test (ASTM C143)

Concrete Air Content Test (ASTM C173)

Unit Weight, Lightweight Concrete (ASTM C567)

Aggregate, Normal Weight: Gradation (ASTM C33)

Deleterious Substances (ASTM C33)

Soundness (ASTM C33)

Abrasion (ASTM C33)	_____
Aggregate, Lightweight Gradation (ASTM C330)	_____
Deleterious Substances (ASTM C330)	_____
Unit Weight (ASTM C330)	_____
Flatness and Levelness Readings (ASTM E1155) (number of days)	_____
F. Reinforcing Steel:	
Tensile Test (ASTM A370)	_____
Bend Test (ASTM A370)	_____
Mechanical Splice (ASTM A370)	_____
Welded Splice Test (ASTM A370)	_____
H. Prestressed Concrete:	
Testing Strands (ASTM A416)	_____
I. Masonry:	
Making and Curing Test Cubes (ASTM C109)	_____
Compressive Strength, Test Cubes (ASTM C109)	_____
Sampling and Testing Mortar, Comp. Strength (ASTM C780)	_____
Sampling and Testing Grout, Comp. Strength (ASTM C1019)	_____
Masonry Unit, Compressive Strength (ASTM C140)	_____
Prism Tests (ASTM C1314)	_____
J. Structural Steel:	
Ultrasonic Testing of Welds (ASTM E164)	_____
Magnetic Particle Testing of Welds (ASTM E709)	_____
Radiographic Testing of Welds (ASTM E94)	_____
K. Sprayed-On Fireproofing:	
Thickness and Density Tests (ASTM E605)	_____
//L. Inspection:	
Technical Personnel (Man-days)	_____//
//L. Technical Personnel:	(Minimum _____ months)
1. Technicians to perform tests and inspection listed above. Laboratory will be equipped with concrete cylinder storage facilities, compression machine, cube molds, proctor molds,	

balances, scales, moisture ovens, slump cones, air meter, and
all necessary equipment for compaction control. //

- - - E N D - - -

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

1.2 QUALITY CONTROL

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

1.3 REFERENCES

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

1.4 SUBMITTALS

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

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

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

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

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

- permanent erosion and sedimentation control features shown on the Site Erosion & Sediment Control Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 7. Manage and control spoil areas on Government property to limit spoil to areas 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 Resident Engineer.
- 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 South Dakota Ambient Air Quality Standards 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 Resident Engineer. 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 Resident Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70

Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

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

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

- b. Use shields or other physical barriers to restrict noise transmission.
- c. Provide soundproof housings or enclosures for noise-producing machinery.
- d. Use efficient silencers on equipment air intakes.
- e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
- f. Line hoppers and storage bins with sound deadening material.
- g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the

property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face.

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

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

- - - E N D - - -

SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

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 - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 01 58 16

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or pad.
 - 11. Gypsum board.
 - 12. Insulation.
 - 13. Paint.
 - 14. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

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

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

1.4 TERMINOLOGY

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

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

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.

3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

- A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC):
LEED Green Building Rating System for New Construction

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 COLLECTION

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

3.2 DISPOSAL

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

3.3 REPORT

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

- - - E N D - - -

SECTION 01 91 00

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING DESCRIPTION

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

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

1. Verify that the applicable equipment and systems are installed in accordance with the 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 Resident Engineer as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.
- B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Resident Engineer and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the Resident Engineer and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the Resident Engineer.
- C. Whole Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to

the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

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

1.3 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 32.16.15 PROJECT SCHEDULES
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- D. Section 21 08 00 COMMISSIONING OF FIRE PROTECTION SYSTEMS.
- 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.
- H. Section 27 08 00 COMMISSIONING OF COMMUNICATIONS SYSTEMS.
- I. Section 28 08 00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY 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.

1.5 ACRONYMS

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

List of Acronyms	
Acronym	Meaning
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 Resident Engineer
USGBC	United States Green Building Council

1.6 DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Deficiency: See "Commissioning Issue".

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

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

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

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

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

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

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

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

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

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

Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC

controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

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

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

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

Maintainability also includes components that have readily obtainable repair parts or service.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.7 SYSTEMS TO BE COMMISSIONED

- A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA’s Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.
- B. The following systems will be commissioned as part of this project:

Systems To Be Commissioned	
System	Description
Fire Suppression	
Fire Pump	Fire Pump, jockey pump, fire pump controller/ATS
Fire Sprinkler Systems	Wet pipe system, dry pipe system, pre-action system, special agent systems
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

Systems To Be Commissioned	
System	Description
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
Medical Gas Systems (other than Medical Air Systems)	Medical gas (oxygen, nitrogen, nitrous oxide, etc.) tank/manifold systems, outlet certification, cross-connection verification
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
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)

Systems To Be Commissioned	
System	Description
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 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
Humidity Control Systems	Humidifiers, de-humidifiers, controls, interface with facility DDC
Hydronic Distribution Systems	Pumps, DDC control panels, heat exchangers,
Facility Fuel Systems	Boiler fuel system, generator fuel system
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)

Systems To Be Commissioned	
System	Description
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
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
Communications	
Grounding & Bonding System	Witness 3rd party testing, review reports
Structured Cabling System	Witness 3rd party testing, review reports
Master Antenna Television System	Witness 3rd party testing, review reports
Public Address & Mass Notification Systems	Witness 3rd party testing, review reports
Intercom & Program Systems	Witness 3rd party testing, review reports
Nurse Call & Code Blue Systems	Witness 3rd party testing, review reports
Security Emergency Call Systems	Witness 3rd party testing, review reports
Duress Alarm Systems	Witness 3rd party testing, review reports

Systems To Be Commissioned	
System	Description
Electronic Safety and Security	
Grounding & Bonding	Witness 3rd party testing, review reports
Physical Access Control Systems	Witness 3rd party testing, review reports
Access Control Systems	Witness 3rd party testing, review reports
Security Access Detection Systems	Witness 3rd party testing, review reports
Video Surveillance System	Witness 3rd party testing, review reports
Electronic Personal Protection System	Witness 3rd party testing, review reports
Fire Detection and Alarm System	100% device acceptance testing, battery draw-down test, verify system monitoring, verify interface with other systems.
Integrated Systems Tests	
Loss of Power Response	Loss of power to building, loss of power to campus, restoration of power to building, restoration of power to campus.
Fire Alarm Response	Integrated System Response to Fire Alarm Condition and Return to Normal

1.8 COMMISSIONING TEAM

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

C. Members Appointed by VA:

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

1.9 VA'S COMMISSIONING RESPONSIBILITIES

- A. Appoint an individual, company or firm to act as the Commissioning Agent.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
 1. Coordination meetings.
 2. Training in operation and maintenance of systems, subsystems, and equipment.
 3. Testing meetings.
 4. Witness and assist in Systems Functional Performance Testing.
 5. Demonstration of operation of systems, subsystems, and equipment.
- C. Provide the Construction Documents, prepared by Architect and approved by VA, to the Commissioning Agent and for use in managing the commissioning process, developing the commissioning plan, systems manuals, and reviewing the operation and maintenance training plan.

1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES

- A. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.
- B. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.
- C. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 1. Participate in commissioning coordination meetings.

2. Conduct operation and maintenance training sessions in accordance with approved training plans.
3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
5. Review and comment on commissioning documentation.
6. Participate in meetings to coordinate Systems Functional Performance Testing.
7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
8. Provide information to the Commissioning Agent for developing commissioning plan.
9. Participate in training sessions for VA's operation and maintenance personnel.
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

1.11 COMMISSIONING AGENT'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.
- C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.
- D. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for

- operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.
- E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
 - F. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.
 - G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
 - H. Coordinate Systems Functional Performance Testing schedule with the Contractor.
 - I. Witness selected systems startups.
 - J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
 - K. Witness and document Systems Functional Performance Testing.
 - L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
 - M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Section 01 00 00 GENERAL REQUIREMENTS.
 - N. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.
 - O. Prepare commissioning Field Observation Reports.
 - P. Prepare the Final Commissioning Report.
 - Q. Return to the site at 10 months into the 12-month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as

originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

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

1.12 COMMISSIONING DOCUMENTATION

- A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
 - 2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
 - 3. Identification of systems and equipment to be commissioned.
 - 4. Schedule of Commissioning Coordination meetings.
 - 5. Identification of items that must be completed before the next operation can proceed.
 - 6. Description of responsibilities of commissioning team members.
 - 7. Description of observations to be made.
 - 8. Description of requirements for operation and maintenance training.
 - 9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
 - 10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
 - 11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
 - 12. Preliminary Systems Functional Performance Test procedures.
- B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for

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

1. Name and identification code of tested system.
 2. Test number.
 3. Time and date of test.
 4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
 5. Dated signatures of the person performing test and of the witness, if applicable.
 6. Individuals present for test.
 7. Observations and Issues.
 8. Issue number, if any, generated as the result of test.
- C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.
- D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

- E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.
- F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.
1. Creating a Commissioning Issues Log Entry:
 - a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
 - b. Assign a descriptive title for the issue.
 - c. Identify date and time of the issue.
 - d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
 - e. Identify system, subsystem, and equipment to which the issue applies.
 - f. Identify location of system, subsystem, and equipment.
 - g. Include information that may be helpful in diagnosing or evaluating the issue.
 - h. Note recommended corrective action.
 - i. Identify commissioning team member responsible for corrective action.
 - j. Identify expected date of correction.
 - k. Identify person that identified the issue.
 2. Documenting Issue Resolution:
 - a. Log date correction is completed or the issue is resolved.

- b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
 - c. Identify changes to the Contract Documents that may require action.
 - d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
 - e. Identify person(s) who corrected or resolved the issue.
 - f. Identify person(s) verifying the issue resolution.
- G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:
- 1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
 - 2. Commissioning plan.
 - 3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
 - 4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
 - 5. Commissioning Issues Log.
 - 6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.
- H. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform

according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:

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

1.13 SUBMITTALS

- A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:
1. The Commissioning Team: A list of commissioning team members by organization.
 2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).

3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
 4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
 5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
 6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
 7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system's testing.
- B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor's project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.
- C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.
- D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.

- E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.
- F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA Resident Engineer with copies to the Contractor and Architect.
- G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.
- H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.
- I. Data for Commissioning:
 - 1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
 - 2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

1.14 COMMISSIONING PROCESS

- A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.
- B. Within 30 days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.

C. Within 30 days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

1.15 QUALITY ASSURANCE

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

1.16 COORDINATION

- A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.

- C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.
- D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.
- F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

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

year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

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

Construction Phase		CxA = Commissioning Agent						L = Lead 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			
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O			

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

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

Acceptance Phase		CxA = Commissioning Agent							L = Lead	
		RE = Resident Engineer	A/E = Design Arch/Engineer	PC = Prime Contractor	O&M = Gov't Facility O&M	PC	O&M	P = Participate	O = Optional	
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				
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				

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

Warranty Phase	Task Description	CxA = Commissioning Agent					Notes
		RE = Resident Engineer	A/E = Design Arch/Engineer	PC = Prime Contractor	O&M = Gov't Facility O&M	O&M	
Commissioning Roles & Responsibilities	Category	CxA	RE	A/E	PC	O&M	
	Meetings	L	A	O	P	P	
Site Observations	Post-Occupancy User Review Meeting						
	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	

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.

a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.

b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.

2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.

a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.

b. The full startup plan shall at a minimum consist of the following items:

1) The Pre-Functional Checklists.

2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.

3) The manufacturer's normally used field checkout sheets.

c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.

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

3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP

- A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.
- B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall

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

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

3.4 PHASED COMMISSIONING

- A. Not Applicable to this project.

3.5 DDC SYSTEM TRENDING FOR COMMISSIONING

- A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.
- B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers - Critical, Priority, and Maintenance.
 1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
 2. Priority level alarms are to be printed to a printer which is connected to the Operator's Work Station located within the engineer's office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.
 3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

- C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.
- D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Resident Engineer and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:
1. Pre-testing, Testing, and Post-testing - Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the Resident Engineer. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the Resident Engineer, prior to the execution of Systems Functional Performance Testing.
 2. Dynamic plotting - The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
 3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The

plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.

4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

~~Spec Writer Note: The following tables provide guidelines for system trends and alarms. Coordinate the types of systems and point names with the construction documents. Verify alarm priorities, ranges and delay. The Design Engineer may elect to include trending and alarm information on the DDC Control Schematics and Sequences of Operations in the Construction Drawing set or in the DDC Control Specifications. Verify the control drawings and/or DDC specifications have included reference to this section of 01 91 00. If adequately included in the drawings or specifications, the following tables should be deleted to prevent duplication and possible conflicts.~~

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

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

Dual-Path Air Handling Unit Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Exhaust Fan S/S	DO	COV	24 hours	3 days	N/A		
AHU Energy	Calc	1 Hour	30 day	N/A	N/A		

Terminal Unit (VAV, CAV, etc.) Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Space Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Air Flow	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Min	12 hours	3 days	P	±5°F from SP	10 min
Local Setpoint	AI	15 Min	12 hours	3 days	M	±10°F from SP	60 min
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	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
Space Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min
SA Temperature	AI	15 Minutes	12 hours	3 days	P	±5°F from SP	10 min

4-Pipe Fan Coil Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
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		
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

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

Steam and Condensate Pumps Trending and Alarms							
Point	Type	Trend Interval	Operational 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		

Steam and Condensate Pumps Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
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

Domestic Hot Water Trending and Alarms							
Point	Type	Trend Interval	Operational 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 oF	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	Operational 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		
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		

Hydronic Hot Water Trending and Alarms							
Point	Type	Trend Interval	Operational Trend Duration	Testing Trend Duration	Alarm Type	Alarm Range	Alarm Delay
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		

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

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

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

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

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

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

3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

- A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.
- B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
- C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about

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

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

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

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

- F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.
- G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.
- H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.
- J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance

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

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

3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

- A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.
- B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.
1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
 2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
 3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
 4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
 - a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the

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

- b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
- a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
 - b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.
 - c. The Commissioning Agent will document the resolution process.
 - d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.
- C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing

defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:

1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
 2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
 4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
 5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the VA. The Commissioning Agent will evaluate each test and report to the VA using a standard form. The VA will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

3.8 DEFERRED TESTING

- A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests

shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.

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

3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent will convene a training preparation conference to include VA's Resident Engineer, VA's Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.
- B. The Contractor shall provide training and demonstration as required by other Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 sections. The Training and Demonstration shall include, but is not limited to, the following:
1. Review the Contract Documents.
 2. Review installed systems, subsystems, and equipment.
 3. Review instructor qualifications.
 4. Review instructional methods and procedures.
 5. Review training module outlines and contents.
 6. Review course materials (including operation and maintenance manuals).
 7. Review and discuss locations and other facilities required for instruction.

8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
 9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
- C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
 2. Qualification Data: Submit qualifications for facilitator and/or instructor.
 3. Attendance Record: For each training module, submit list of participants and length of instruction time.
 4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
 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.
 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 21 13

SITE SURVEYS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Researching and collecting documents informing surveys.
 - 2. Performing topographic survey and utility survey.
 - 3. Creating survey drawings.

1.2 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Land Title Association and American Congress on Surveying and Mapping (ALTA-ACSM):
 - 1. Accuracy Standards for ALTA-ACSM Land Title Surveys.
- C. Federal Geographic Data Committee (FGDC):
 - 1. STD-007.03-98 - Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy.
 - 2. STD-007.04-02 - Geospatial Positioning Accuracy Standards Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management.

1.3 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Survey Drawings:
 - 1. Prints: Two sets of black line, full size prints of each drawing.
 - 2. Electronic Files: Consistent with computer-aided design (CAD) Standards described at www.cfm.va.gov/til/projReq.asp.

1.4 QUALITY ASSURANCE

- A. Land Surveyor: One of the following:
 - 1. Experienced professional land surveyor licensed in state in which project is located.
 - 2. Experienced professional civil engineer licensed in state in which project is located and authorized to practice land surveying as civil engineer.

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 ACCESSORIES

- A. Monuments: Iron pin, with driven 16 mm (5/8 inch) diameter, minimum 600 mm (24 inches) long to prevent displacement.
- B. Stakes: Hardwood.
- C. Flagging: Plastic, roll form, highly visible, solid color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Research public and VA facility records for deeds, maps, monuments, plats, surveys, title certificates or abstracts, rights-of-way, easements, section line, other boundary line locations, and other documents pertaining to project site.
- B. Research public and VA facility utility records for aerial, surface, and subgrade structures and utility service lines and easements.

3.2 PREPARATION

- A. Coordinate with Contracting Officer's Representative for site access.
- B. Coordinate with adjacent property owners when access to adjoining properties is required.
 - 1. Notify Contracting Officer's Representative when access is denied.

3.3 SURVEYS

- A. Perform survey on ground according to Accuracy Standards for ALTA-ACSM Land Title Surveys.
- B. Topographic Survey:
 - 1. Vertical Control: National Geodetic Survey or existing VA Medical Center benchmark.
 - 2. Determine project site contours at maximum 300 mm (1 foot) interval.
 - 3. Determine spot elevations at specified locations.
- C. Utility Survey:
 - 1. Locate piped utilities and utility structures. Identify service type, sizes, depths, and pressures.
 - 2. Locate fire hydrants.
 - 3. Locate wired utilities and utility structures. Identify service type, rated capacities, and elevations above and below grade.
 - 4. Identify each utility authority including contact person and phone number.
- D. Locate permanent structures within survey boundary by perpendicular dimension to property lines.
 - 1. Determine structure plan dimensions, heights, and vertical offsets.

2. Determine projections and overhangs beyond structure perimeter at grade.
 3. Determine number of stories and primary building materials.
- E. Locate rights-of-way and easements within and adjacent to survey boundary by perpendicular dimension to property line.
1. Locate project site access from rights-of-way by dimension from survey monument. Determine site access width.

3.4 SURVEY DRAWING REQUIREMENTS

- A. Consult Contracting Officer's Representative to confirm required survey scale and drawing size.
1. Drawing Size: Maximum 760 by 1070 mm (30 by 42 inches).
 2. Boundary Survey Scale: Maximum 1 to 35 (1 inch equals 30 feet).
 3. Enlarged Detail Areas: Scale as required to present dimensional data and survey information clearly. Maintain orientation aligned with smaller scale view.
 4. Plan Orientation: North at top of drawing sheet.
- B. Drawing Notations:
1. Land Surveyor: Name, address, telephone number, signature, seal, and registration number.
 2. Survey Dates: Date survey was initially completed and subsequent revision dates.
 3. Certification: Certify each drawing adjacent to land surveyor's seal:
 - a. "I hereby certify that all information indicated on this drawing was obtained or verified by actual measurements in the field and that every effort has been made to provide complete and accurate information."
 - b. Title, number, and total number of drawings on each drawing.
 - c. Scale in metric and imperial measurement.
 - d. Graphic scale in metric and imperial measurement.
 - e. Graphic symbol and abbreviation legends.
 - f. North arrow for plan view drawings.
 - g. Benchmark locations.
 - h. Horizontal and vertical control datum.
 - i. Adjacent property owner names.
 - j. Zoning classifications.
 - k. Building street numbers.

4. Evidence of Possession: Indicate character and location of evidence of possession affecting project site. Notation absence signifies no observable evidence of possession.
- C. Vicinity Map: Indicate project site and nearby roadways and intersections.
- D. Record Documents Forming Survey Basis: Indicate titles, source, and recording data of documents relied upon to complete survey.
- E. Legal Description: Recorded title boundaries.
- F. Land Area: Report in sq. m (sf) or hectares (acres) as defined by the boundaries of the legal description of the surveyed premises, including legal description of the land.
 1. Accuracy: 0.1 sq. m (1 sq. ft.).
- G. Boundary Lines: Show point of beginning, length and bearing for straight lines, and angle, radius, point of curvature, point of tangency, and length of curved lines.
 1. Include bearing basis and data necessary to mathematically close survey.
 2. When recorded and measured bearings, angles, and distances differ, indicate both recorded and measured data.
 - a. Indicate when recorded description does not mathematically close survey.
 3. Indicate found and installed monuments establishing basis of survey.
 4. Contiguity, Gores, and Overlaps: Identify discrepancies within and along survey boundary.
- H. Lots and Parcels: Indicate entire lots and parcels included within and intersected by survey boundary.
- I. Roadways: Indicate names and widths of rights-of-way and roadways within and abutting survey boundary.
 1. Indicate changes in rights-of-way lines either completed or proposed.
 2. Indicate accesses to roadways.
 3. Indicate abandoned roadways.
 4. Indicated unopened dedicated roadways.
- J. Setbacks: Indicate recorded setback and building restriction lines.
- K. Structures and Site Improvements: Indicate buildings, walls, fences, signs, and other visible improvements.
 1. Indicate each building dimensioned to property lines and other structures.

2. Indicate exterior dimensions of buildings at ground level. Show area of building footprint and gross floor area of entire building.
3. Indicate maximum measured height of buildings above grade, point of measurement, and number of stories.
4. Indicate spot elevations at building entrances, first floor, service docks, corners, steps, ramps, and grade slabs.
5. Indicate structures and site improvements within 1500 mm (5 feet) of survey boundary.
6. Indicate encroachments on project site, adjoining property, easements, rights-of-way, and setback lines from fire escapes, bay windows, windows and doors opening out, flue pipes, stoops, eaves, cornices, areaways, stoops, other building projections, and site improvements.
7. Identify setback, height, and floor space area restrictions set by applicable zoning and building codes and recorded subdivision maps. Indicate if no restrictions exist.

L. Easements:

1. Indicate easements evidenced by recorded documents.
 - a. Indicate when easements cannot be located.
2. Indicate observable easements created by roadways, rights-of-ways, water courses, drains, telephone, telegraph, electric and other wiring, water, sewer, oil, gas, and other pipelines within project site and on adjoining properties when potentially affecting project site.
3. Indicate observable surface improvements of underground easements.

M. Pavements:

1. Indicate location, alignment, and dimensions for vehicular and pedestrian pavements.
2. Indicate pavement encroachments from adjacent properties onto project site and onto adjacent properties from project site.
 - a. Dimension encroachments from survey boundary.
3. Indicate roadway centerlines with true bearings and lengths by 15 m (50 feet) stationing.
 - a. Describe curves by designating points of curvature and tangency. Include curve data and location of radius and vertex points.
 - b. Indicate elevations at station points along roadway centerlines, roadway edges, and top and bottom of curbs.

4. Indicate parking areas, parking striping, and total parking spaces.
 - a. Identify accessible parking spaces.
5. Indicate curb cuts, driveways, and other accesses to public ways.
- N. Indicate cemetery and burial ground boundaries.
- O. Waterways:
 1. Indicate boundaries of ponds, lakes, springs, and rivers bordering on or running through project site. Note date of measurement and that boundary is subject to change due to natural causes.
 2. Indicate flood plain location and elevation.
 3. Indicate watershed extent affecting project site.
- P. Indicate topographic contours.
- Q. Flood Zone: Indicate applicable flood zone from Federal Flood Insurance Rate Maps, by scaled map location and graphic plotting.
- R. Public and Private Utilities:
 1. Indicate information source and operating authority for each utility.
 2. Indicate utilities existing on or serving project site.
 3. Indicate fire hydrants on project site and within 150 m (500 feet) of survey boundary.
 4. Indicate manholes, catch basins, inlets, vaults, and other surface indications of subgrade services.
 5. Indicate depths or invert elevations, sizes, materials, and pressures of utility pipes.
 6. Indicate wires and cables serving, crossing, and adjacent to project site.
 7. Indicate exterior lighting, traffic control facilities, security, and communications systems.
 8. Indicate utility poles on project site and within 3 m (10 feet) of survey boundary.
 9. Indicate dimensions of cross-wires or overhangs affecting project site.
- S. Observable Evidence:
 1. Indicate in-progress and recently completed earth moving work, building construction, and building additions.
 2. Indicate in-progress and recently completed pavement construction and repairs.
 3. Indicate areas used as solid waste dump, sump, and sanitary landfill.

T. Trees:

1. Indicate individual trees with minimum 150 mm (6 inches) diameter measured at 400 mm (48 inches) above grade.
2. Indicate wooded area perimeter outline and description of predominant vegetation.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

- A. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Asbestos Removal: Section 02 82 13.13, GLOVEBAG ASBESTOS ABATEMENT.
- F. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- G. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- H. 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.
- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it

results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.

- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
 - 1. No wall or part of wall shall be permitted to fall outwardly from structures.
 - 2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
 - 3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- G. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Resident Engineer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Resident Engineer's approval.
- H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS 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:

- 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 Resident Engineer. 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.
- D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- 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 Resident Engineer. When Utility lines are encountered that are not indicated on the drawings, the Resident Engineer shall be notified prior to further work in that area.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Resident Engineer. Clean-up shall include off the Medical Center disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 02 82 13.13
GLOVEBAG ASBESTOS ABATEMENT

TABLE OF CONTENTS

PART 1 - GENERAL..... 1

1.1 SUMMARY OF THE WORK..... 1

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS..... 1

1.1.2 EXTENT OF WORK..... 1

1.1.3 RELATED WORK..... 1

1.1.4 TASKS..... 1

1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES..... 2

1.2 VARIATIONS IN QUANTITY..... 2

1.3 STOP ASBESTOS REMOVAL..... 2

1.4 DEFINITIONS..... 3

1.4.1 GENERAL..... 3

1.4.2 GLOSSARY..... 3

1.4.3 REFERENCED STANDARDS ORGANIZATIONS..... 9

1.5 APPLICABLE CODES AND REGULATIONS..... 11

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS..... 11

1.5.2 Asbestos Abatement CONTRACTOR RESPONSIBILITY..... 11

1.5.3 FEDERAL REQUIREMENTS..... 11

1.5.4 STATE REQUIREMENTS:..... 12

1.5.5 LOCAL REQUIREMENTS..... 12

1.5.6 STANDARDS..... 12

1.5.7 EPA GUIDANCE DOCUMENTS..... 12

1.5.8 NOTICES..... 12

1.5.9 PERMITS/LICENSES..... 12

1.5.10 POSTING AND FILING OF REGULATIONS..... 13

1.5.11 VA RESPONSIBILITIES..... 13

1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS..... 13

1.5.14 PRE-Construction MEETING..... 14

1.6 PROJECT COORDINATION..... 14

1.6.1 PERSONNEL..... 15

1.7 RESPIRATORY PROTECTION..... 16

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM..... 16

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR..... 16

1.7.3 SELECTION AND USE OF RESPIRATORS..... 16

1.7.4 MINIMUM RESPIRATORY PROTECTION..... 16

1.7.5 MEDICAL WRITTEN OPINION..... 16

1.7.6 RESPIRATOR FIT TEST..... 16

1.7.7 RESPIRATOR FIT CHECK..... 17

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS..... 17

1.8 WORKER PROTECTION..... 17

1.8.1 TRAINING OF ABATEMENT PERSONNEL..... 17

1.8.2 MEDICAL EXAMINATIONS..... 17

1.8.3 personal PROTECTIVE EQUIPMENT..... 17

1.8.4 REGULATED AREA ENTRY PROCEDURE..... 17

1.8.5 DECONTAMINATION PROCEDURE..... 18

1.8.6 REGULATED AREA REQUIREMENTS..... 18

1.9 DECONTAMINATION FACILITIES..... 18

1.9.1 DESCRIPTION..... 18

1.9.2 GENERAL REQUIREMENTS..... 19

1.9.3 TEMPORARY FACILITIES TO THE PDF and w/EDF..... 19

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)..... 19

1.9.5 waste/EQUIPMENT DECONTAMINATION FACILITY (w/EDF)..... 21

1.9.6 waste/EQUIPMENT DECONTAMINATION PROCEDURES..... 22

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT..... 22

2.1 MATERIALS AND EQUIPMENT..... 22

2.1.1 GENERAL REQUIREMENTS (all abatement projects)..... 22

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA..... 23

2.2.1 GENERAL..... 23

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA..... 24

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA..... 24

2.2.4 CRITICAL BARRIERS..... 24

2.2.5 SECONDARY BARRIERS..... 24

2.2.6 EXTENSION OF THE REGULATED AREA..... 24

2.2.7 FIRESTOPPING..... 24

2.3 MONITORING, INSPECTION AND TESTING..... 25

2.3.1 GENERAL..... 25

2.3.2 SCOPE OF SERVICES OF THE VPIH/cih CONSULTANT..... 26

2.3.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR
CPIH/CIH..... 26

2.4 Asbestos hazard abatement plan..... 27

2.5 SUBMITTALS..... 28

2.5.1 PRE-start MEETING SUBMITTALS..... 28

2.5.2 SUBMITTALS DURING ABATEMENT..... 29

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT..... 30

2.6 ENCAPSULANTS..... 30

2.6.1 TYPES OF ENCAPSULANTS..... 30

2.6.2 PERFORMANCE REQUIREMENTS..... 30

2.7 CERTIFICATES OF COMPLIANCE..... 31

2.8 RECYCLABLE PROTECTIVE CLOTHING..... 31

PART 3 - EXECUTION..... 31

3.1 REGULATED AREA PREPARATIONS..... 31

3.1.1 SITE SECURITY..... 31

3.1.2 OSHA DANGER SIGNS..... 32

3.1.3.1 SHUT DOWN - LOCK OUT ELECTRICAL..... 32

3.1.3.2 SHUT DOWN - LOCK OUT HVAC..... 32

3.1.4 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA..... 32

3.1.4.1 GENERAL..... 32

3.1.4.2 PREPARATION PRIOR TO SEALING OFF..... 33

3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA..... 33

3.1.4.4 CRITICAL BARRIERS..... 33

3.1.4.5 EXTENSION OF THE REGULATED AREA..... 33

3.1.4.6 floor barriers:..... 33

3.1.5 SANITARY FACILITIES..... 33

3.1.6 Pre-Cleaning..... 34

3.1.6.1 PRE-CLEANING MOVABLE OBJECTS..... 34

3.1.6.2 PRE-CLEANING FIXED OBJECTS..... 34

3.1.6.3 PRE-CLEANING SURFACES IN THE REGULATED AREA..... 34

3.1.7 PRE-ABATEMENT ACTIVITIES..... 34

3.1.7.1 PRE-ABATEMENT MEETING..... 34

3.1.7.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS..... 35

3.1.7.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS..... 35

3.2 REMOVAL OF piping ACM..... 36

3.2.1 WETTING MATERIALS..... 36

3.2.2 SECONDARY BARRIER AND WALKWAYS..... 36

3.2.3 WET REMOVAL OF ACM..... 36

3.3 GLOVEBAG REMOVAL PROCEDURES..... 37

3.3.1 GENERAL..... 37

3.3.2 NEGATIVE PRESSURE GLOVEBAG PROCEDURE..... 38

3.4 LOCKDOWN ENCAPSULATION..... 38

3.4.1 GENERAL..... 38
3.4.2 SEALING EXPOSED EDGES..... 38
3.5 DISPOSAL OF ACM WASTE MATERIALS..... 38
3.5.1 GENERAL..... 38
3.5.2 PROCEDURES..... 38
3.6 PROJECT DECONTAMINATION..... 39
3.6.1 GENERAL..... 39
3.6.2 REGULATED AREA CLEARANCE..... 39
3.6.3 WORK DESCRIPTION..... 39
3.6.4 PRE-DECONTAMINATION CONDITIONS..... 39
3.6.5 FIRST CLEANING..... 40
3.6.6 PRE-CLEARANCE INSPECTION AND TESTING..... 40
3.6.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES..... 40
3.7 FINAL VISUAL INSPECTIOns AND AIR CLEARANCE TESTING..... 40
3.7.1 GENERAL..... 40
3.7.2 FINAL VISUAL INSPECTION..... 40
3.7.3 FINAL AIR CLEARANCE TESTING..... 40
3.7.4 FINAL AIR CLEARANCE PROCEDURES..... 41
3.7.5 CLEARANCE SAMPLING USING PCM..... 41
3.7.6 CLEARANCE SAMPLING USING TEM..... 41
3.7.7 LABORATORY TESTING OF PCM SAMPLES..... 42
3.7.8 LABORATORY TESTING OF TEM SAMPLES..... 42
3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE..... 42
3.8.1 COMPLETION OF ABATEMENT WORK..... 42
3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR..... 42
3.8.3 WORK SHIFTS..... 42
3.8.4 RE-INSULATION..... 42
ATTACHMENT #1..... 44
ATTACHMENT #2..... 45
ATTACHMENT #3..... 46
ATTACHMENT #4..... 47

02 82 13.13
GLOVEBAG ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 SUMMARY OF THE WORK

1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS

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

1.1.2 EXTENT OF WORK

- A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated by the glovebag method. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of ACM piping and fittings and asbestos contaminated elements in an appropriate regulated area in the following approximate quantities:
 - Linear feet of pipe insulation to be determined.
 - Number of insulated pipe fittings to be determined.Quantities will be determined as they are encountered

1.1.3 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING.
- B. Section 02 41 00, DEMOLITION.
- C. Division 22, PLUMBING.

1.1.4 TASKS

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparations, emergency procedures arrangements, and Asbestos Hazard Abatement Plans for glovebag asbestos abatement work.

- B. Abatement activities including removal, clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
- C. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved VA Design and Construction Procedures. VA Design and Construction Procedures drawings of partially occupied buildings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action. The following limitations of use shall apply to existing facilities shown on drawings: Coordinate with general contractor and VA representative.

1.2 VARIATIONS IN QUANTITY

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimated, which are limited by the physical constraints imposed by occupancy of the buildings and accessibility to ACM. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the contractor shall provide unit prices for newly discovered ACM and those prices shall be used for additional work required under the contractor.

1.3 STOP ASBESTOS REMOVAL

If the Contracting Officer; their field representative; (the facility Safety Officer/Manager or their designee, or the VA Professional Industrial Hygienist/ Certified Industrial Hygienist (VPIH/CIH) presents a verbal **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed ACM. If a verbal Stop Asbestos Removal Order is issued, the VA shall follow-up with a written order to the Contractor as soon as it is practicable. The Contractor shall not resume any asbestos removal activity until authorized to do so in writing by the VA Contracting Officer. A stop asbestos removal order may be issued at any time the VA Contracting Officer determines abatement conditions/activities are not within VA specification, regulatory requirements or that an imminent hazard exists to human health or the environment. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the VPIH/CIH time. The occurrence of any of

the following events shall be reported immediately by the Contractor's competent person to the VA Contracting Office or field representative using the most expeditious means (e.g., verbal or telephonic), followed up with written notification to the Contracting Officer as soon as practical. The Contractor shall immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

- A. Airborne PCM analysis results equal to or greater than 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
- B. breach or break in regulated area containment barrier(s);
- C. less than -0.02" WCG pressure in the regulated area;
- D. serious injury/death at the site;
- E. fire/safety emergency at the site;
- F. respiratory protection system failure;
- G. power failure or loss of wetting agent; or
- H. any visible emissions observed outside the regulated area.

1.4 DEFINITIONS

1.4.1 GENERAL

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

1.4.2 GLOSSARY

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

Aerosol - Solid or liquid particulate suspended in air.

Adequately wet - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

Aggressive method - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.

Aggressive sampling - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.

AHERA - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.

Aircell - Pipe or duct insulation made of corrugated cardboard which contains asbestos.

Air monitoring - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air. For personal samples and clearance air testing using Phase Contrast Microscopy (PCM) analysis. NIOSH Method 7402 can be used when it is necessary to confirm fibers counted by PCM as being asbestos. The AHERA TEM analysis may be used for background, area samples and clearance samples when required by this specification, or at the discretion of the VPIH/CIH as appropriate.

Air sample filter - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM

(Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

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

Asbestos - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

Asbestos Hazard Abatement Plan (AHAP) - Asbestos work procedures required to be submitted by the contractor before work begins.

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

Asbestos contaminated elements (ACE) - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

Asbestos-contaminated soil (ACS) - Soil found in the work area or in adjacent areas such as crawlspaces or pipe tunnels which is contaminated with asbestos-containing material debris and cannot be easily separated from the material.

Asbestos-containing waste (ACW) material - Asbestos-containing material or asbestos contaminated objects requiring disposal.

Asbestos Project Monitor - Some states require that any person conducting asbestos abatement clearance inspections and clearance air sampling be licensed as an asbestos project monitor.

Asbestos waste decontamination facility - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it may be used to evacuate personnel.

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

Authorized visitor - Any person approved by the VA; the contractor; or any government agency representative having jurisdiction over the regulated area (e.g., OSHA, Federal and State EPA).

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

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

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

Primary Barrier - Plastic barriers placed over critical barriers and exposed directly to abatement work.

Secondary Barrier - Any additional plastic barriers used to isolate and provide protection from debris during abatement work.

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

Bridging encapsulant - An encapsulant that forms a layer on the surface of the ACM.

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

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

Certified Industrial Hygienist (CIH) - A person certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.

Class I asbestos work - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).

Class II asbestos work - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic.

Clean room/Changing room - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.

Clearance sample - The final air sample taken after all asbestos work has been done and visually inspected. Performed by the VA's professional industrial hygiene consultant/Certified Industrial Hygienist (VPIH/CIH).

Closely resemble - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

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

Contractor's Professional Industrial Hygienist (CPIH/CIH) - The asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of a PIH and may be a certified industrial hygienist (CIH).

Count - Refers to the fiber count or the average number of fibers greater than five microns in length with a length-to-width (aspect) ratio of at least 3 to 1, per cubic centimeter of air.

Crawlspace - An area which can be found either in or adjacent to the work area. This area has limited access and egress and may contain asbestos materials and/or asbestos contaminated soil.

Decontamination area/unit - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

Demolition - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

VA Total - means a building or substantial part of the building is completely removed, torn or knocked down, bulldozed, flattened, or razed, including removal of building debris.

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

Disturbance - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard

sized glove bag or waste bag, in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag and shall not exceed 60 inches in length or width.

Drum - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be sift-proof, dustproof, and leak-tight.

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

Firestopping - Material used to close the open parts of a structure in order to prevent a fire from spreading.

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

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

High efficiency particulate air (HEPA) filter - An ASHRAE MERV 17 filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

Industrial hygienist technician (IH Technician) - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned. Some states require that an industrial hygienist technician conducting asbestos abatement clearance inspection and clearance air sampling be licensed as an asbestos project monitor.

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

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

National Emission Standards for Hazardous Air Pollutants (NESHAP) - EPA's rule to control emissions of asbestos to the environment (40 CFR Part 61, Subpart M).

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

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

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

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

Organic vapor cartridge - The type of cartridge used on air purifying respirators to remove organic vapor hazardous air contaminants.

Outside air - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

Owner/operator - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Penetrating encapsulant - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

Personal protective equipment (PPE) - equipment designed to protect user from injury and/or specific job hazard. Such equipment may include protective clothing, hard hats, safety glasses, and respirators.

Personal sampling/monitoring - Representative air samples obtained in the breathing zone for one or more workers within the regulated area using a filter cassette and a calibrated air sampling pump to determine asbestos exposure.

Permissible exposure limit (PEL) - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the eight (8) hour time weighted average PEL is 0.1 fibers per cubic centimeter (0.1 f/cc) of air and the 30-minute Excursion Limit is 1.0 fibers per cubic centimeter (1 f/cc).

Pipe tunnel - An area, typically located adjacent to mechanical spaces or boiler rooms in which the pipes servicing the heating system in the building are routed to allow the pipes to access heating elements. These areas may contain asbestos pipe insulation, asbestos fittings, or asbestos-contaminated soil.

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

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

Positive/negative fit check - A method of verifying the seal of a facepiece respirator by temporarily occluding the filters and breathing in (inhaling) and then temporarily occluding the exhalation valve and

breathing out (exhaling) while checking for inward or outward leakage of the respirator respectively.

Presumed ACM (PACM) - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (b).

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

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

Assigned Protection factor - A value assigned by OSHA/NIOSH to indicate the expected protection provided by each respirator class, when the respirator is properly selected and worn correctly. The number indicates the reduction of exposure level from outside to inside the respirator facepiece.

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

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

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

Regulated ACM (RACM) - Friable ACM; Category I non-friable ACM that has become friable; Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.

Removal - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.

Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

Repair - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

Shower room - The portion of the PDF where personnel shower before leaving the regulated area.

Supplied air respirator (SAR) - A respiratory protection system that supplies minimum Grade D respirable air per ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.

Surfacing ACM - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.

Surfactant - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.

Thermal system ACM - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

Transmission electron microscopy (TEM) - A microscopy method that can identify and count asbestos fibers.

VA Professional Industrial Hygienist (VPIH/CIH) - The Department of Veterans Affairs Professional Industrial Hygienist must meet the qualifications of a PIH, and may be a Certified Industrial Hygienist (CIH).

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

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

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

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

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

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

1.4.3 REFERENCED STANDARDS ORGANIZATIONS

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

- A. VA Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888
- C. ANSI American National Standards Institute
1430 Broadway
New York, NY 10018
212-354-3300
- D. ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103
215-299-5400
- E. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420

- F. CGA Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, VA 22202
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)
U. S. Department of Commerce
Government Printing Office
Washington, DC 20420
- H. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949
- I. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420
- I. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000
- K. NEC National Electrical Code (by NFPA)
- L. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037
- M. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555
- N. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236
- O. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402
- P. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

1.5 APPLICABLE CODES AND REGULATIONS

1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY

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

1.5.3 FEDERAL REQUIREMENTS

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

- A. Occupational Safety and Health Administration (OSHA)**
 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
 2. Title 29 CFR 1910 Subpart I - Personal Protective Equipment
 3. Title 29 CFR 1910.134 - Respiratory Protection
 4. Title 29 CFR 1926 - Construction Industry Standards
 5. Title 29 CFR 1910.1020 - Access to Employee Exposure and Medical Records
 6. Title 29 CFR 1910.1200 - Hazard Communication
 7. Title 29 CFR 1910 Subpart K - Medical and First Aid
- B. Environmental Protection Agency (EPA)**
 1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
 2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- C. Department of Transportation (DOT)**
 1. Title 49 CFR 100 - 185 - Transportation

1.5.4 STATE REQUIREMENTS:

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Department of Environment and Natural Resources; Administrative Rules of South Dakota 74:36:08.

1.5.5 LOCAL REQUIREMENTS

If local requirements are more stringent than federal or state standards, the local standards are to be followed: NONE

1.5.6 STANDARDS

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
 - 1. American National Standards Institute (ANSI) Z9.2-79 - Fundamentals Governing the Design and Operation of Local Exhaust Systems and ANSI Z88.2 - Practices for Respiratory Protection.
 - 2. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to, the following:
 - 1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
 - 1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 - 2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
 - 3. NFPA 101 - Life Safety Code

1.5.7 EPA GUIDANCE DOCUMENTS

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007.
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

1.5.8 NOTICES

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification are given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

- A. NOTIFICATION OF DEMOLITION AND RENOVATION; South Dakota Department of Environment and Natural Resources

1.5.10 POSTING AND FILING OF REGULATIONS

Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

1.5.11 VA RESPONSIBILITIES

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment, and personal possessions to avoid unauthorized access into the regulated area. Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized, calibration data and method of analysis. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS

- A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a); (b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.

- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the Asbestos Hazard Abatement Plans during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

1.5.14 PRE-CONSTRUCTION MEETING

Prior to commencing the work, the Contractor shall meet with the VPCIH to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

- A. Proof of Contractor licensing.
- B. Proof the Competent Person is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Asbestos Hazard Abatement Plan. In these procedures, the following information must be detailed, specific for this project.
 - 1. Regulated area preparation procedures;
 - 2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
 - 3. If required, decontamination area set-up/layout and decontamination procedures for employees;
 - 4. Glovebag abatement methods/procedures and equipment to be used; and
 - 5. Personal protective equipment to be used.
- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

1.6 PROJECT COORDINATION

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

1.6.1 PERSONNEL

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of federal (and state as applicable) EPA and OSHA asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work as required by the state; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive Asbestos Hazard Abatement Plans (AHAPs) for asbestos work; and has adequate materials, equipment and supplies to perform the work.
 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project within the past three (3) years; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
 3. The Contractor Professional Industrial Hygienist/CIH (CPIH/CIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete Asbestos Hazard Abatement Plan for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course or equivalent, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
 4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the Asbestos Hazard Abatement Plans of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

All personnel should be in compliance with OSHA construction safety training as applicable and submit certification.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

The Contractor shall develop and implement a written Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910 Subpart I;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written RPP shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c) (1) (i - ix) - Respiratory Protection Program.

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

No employee shall be allowed to wear a respirator unless a physician or other licensed health care professional has provided a written determination they are medically qualified to wear the class of respirator to be used on the project while wearing whole body impermeable garments and subjected to heat or cold stress.

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS

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

1.8 WORKER PROTECTION

1.8.1 TRAINING OF ABATEMENT PERSONNEL

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

1.8.2 MEDICAL EXAMINATIONS

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment.

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

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

1.8.4 REGULATED AREA ENTRY PROCEDURE

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

1.8.5 DECONTAMINATION PROCEDURE

If a decontamination facility is required, the Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

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

1.8.6 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

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

NOTE: OSHA does not require a decontamination area/unit if less than 25 linear feet of glovebagging is conducted.

1.9.2 GENERAL REQUIREMENTS

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

1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF

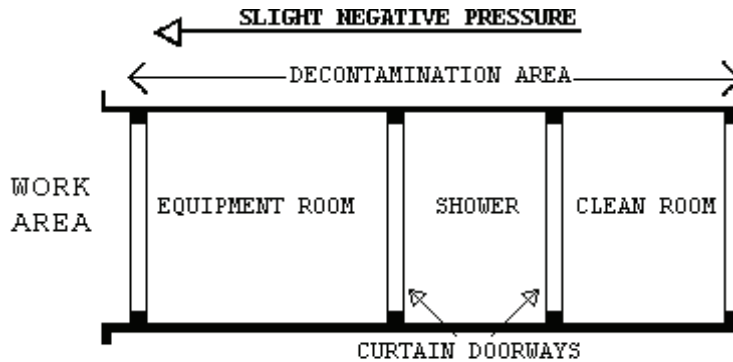
The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead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

1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

If required, the Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly opaque fire retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so

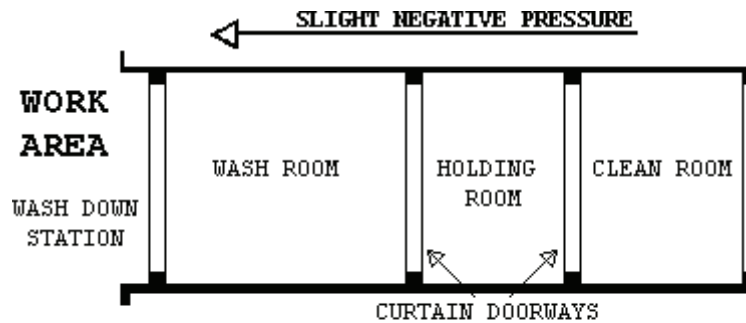
- either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can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



1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

If required, the Competent Person shall provide a W/EDF consisting of a wash room, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment bag and container cleaning station.
2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.
5. The W/EDF shall be as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES

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

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

2.1 MATERIALS AND EQUIPMENT

2.1.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)

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

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable and combustible materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized location.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.

- E. Polyethylene sheeting for critical barriers and floors in the regulated area shall be a minimum of 6-mils. Fire retardant poly shall be used throughout.
- F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
- G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
- H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
- I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.
- J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).
- K. Disposal bags - 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- L. The VA shall be provided an advance copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-project submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.
- M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a written hazard assessment conducted under 29 CFR 1910.132(d).

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces in the regulated area must be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

- A. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with 2 layers of 6-mil fire retardant poly sheeting and secure with duct tape. Lock out and tag out any HVAC systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

2.2.4 CRITICAL BARRIERS

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

2.2.5 SECONDARY BARRIERS

- A. A loose layer of 6 mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the glovebag abatement. This layer shall be replaced as needed during the work.

2.2.6 EXTENSION OF THE REGULATED AREA

- A. If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. If the affected area cannot be added to the regulated area, decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

2.2.7 FIRESTOPPING

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The Contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA Representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.

- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

2.3 MONITORING, INSPECTION AND TESTING

2.3.1 GENERAL

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the Employee exposure to asbestos must not exceed 0.1 fibers per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA may employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH/CIH with review and approval of the VPIH/CIH. An agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

- A. The purpose of the work of the VPIH/CIH is to: Assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
- Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
- Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
- Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
- Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
- Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
- Task 6: Issue certificate of decontamination for each regulated area or building and project report.
- B. All data, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

2.3.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR CPIH/CIH

The Contractor's CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos

Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor (or Abatement Worker) and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

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

- A. Minimum Personnel Qualifications
- B. Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements for Glovebag Abatement
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Monitoring, Inspections, and Testing
- I. Removal Procedures for Piping ACM Using the Glovebag Method
- J. Disposal of ACM waste
- K. Regulated Area Decontamination/Clean-up
- L. Regulated Area Visual and Air Clearance
- M. Project Completion/Closeout

2.5 SUBMITTALS

2.5.1 PRE-START MEETING SUBMITTALS

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

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.
- D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
 1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
 2. Waste water filtration system, shower system, containment barriers.
 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.
 4. Respirators, protective clothing, personal protective equipment.
 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.
- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; and Completion Date
 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; and Resolution.

3. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
 1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.
 2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
 3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
 - J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and Asbestos Hazard Abatement Plans; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
 - K. Rented equipment must be decontaminated prior to returning to the rental agency.
 - L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS, and application instructions.

2.5.2 SUBMITTALS DURING ABATEMENT

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative

air monitoring and results/TWAs/ELs. Submit this information daily to the VPIH/CIH.

- B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
 - 1. Removal of any poly barriers.
 - 2. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
 - 3. Packaging and removal of ACM waste from regulated area.
 - 4. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

The CPIH/CIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It will also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with Attachment #1. All clearance and perimeter area samples must be submitted. The VA Representative will retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

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

2.6.2 PERFORMANCE REQUIREMENTS

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

- A. General Requirements for all Encapsulants:
 - 1. ASTM E84: Flame spread of 25; smoke emission of 50.
 - 2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
 - 3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
 - 4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
 - 1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft²).
 - 2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
 - 3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
 - 4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.

C. Lockdown Encapsulants:

1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft²) (test compatibility with cementitious and fibrous fireproofing).
3. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

2.7 CERTIFICATES OF COMPLIANCE

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

2.8 RECYCLABLE PROTECTIVE CLOTHING

If recyclable clothing is provided, all requirements of EPA, DOT and OSHA shall be met.

PART 3 - EXECUTION

3.1 REGULATED AREA PREPARATIONS

3.1.1 SITE SECURITY

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer or VA Representative using the most expeditious means.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which may result in a flame hazard, fire retardant poly sheeting must be used.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall

be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.

- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA Representative or Competent Person. The VA Police should be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

3.1.1.2 OSHA DANGER SIGNS

Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.

3.1.3.1 SHUT DOWN - LOCK OUT ELECTRICAL

Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

3.1.3.2 SHUT DOWN - LOCK OUT HVAC

Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil poly disposal bags for disposal as asbestos waste.

3.1.4 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

3.1.4.1 GENERAL

Seal off any openings at the perimeter of the regulated area with critical barriers to completely isolate the regulated area and to contain all airborne asbestos contamination created by the abatement activities. Should the adjacent area past the regulated area become contaminated due to improper work activities, the Contractor shall suspend work inside the regulated area, continue wetting, and clean the adjacent areas in accordance with procedures described in these specifications. Any and all costs associated with the adjacent area cleanup shall not be borne by the VA.

3.1.4.2 PREPARATION PRIOR TO SEALING OFF

Place all materials, equipment and supplies necessary to isolate the regulated area inside the regulated area. Remove all movable material/equipment as described above and secure all unmovable material/equipment as described above. Properly secured material/equipment shall be considered to be outside the regulated area.

3.1.4.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

3.1.4.4 CRITICAL BARRIERS

The regulated area must be completely separated from the adjacent area(s) and the outside by at least 2 layers of 6 mil fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed. Light fixtures shall not be operational during abatement. Auxiliary lighting shall be provided. If needed, provide plywood squares 6" x 6" x 3/8" (150mm x 150mm x 18mm) held in place with one 6d smooth masonry/galvanized nail driven through the center of the plywood square and duct tape on the poly so as to clamp the poly to the wall/surface. Locate plywood squares at each end, corner, and 4' (1200mm) maximum on centers.

3.1.4.5 EXTENSION OF THE REGULATED AREA

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels.

3.1.4.6 FLOOR BARRIERS:

All floors within 10' of glovebag work shall be covered with 2 layers of 6 mil fire retardant poly.

3.1.5 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.1.6 PRE-CLEANING

3.1.6.1 PRE-CLEANING MOVABLE OBJECTS

The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area. PPE must be donned by all workers performing pre-cleaning activities. After items have been pre-cleaned and decontaminated, they may be removed from the work area for storage until the completion of abatement in the work area.

Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location.

3.1.6.2 PRE-CLEANING FIXED OBJECTS

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After pre-cleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which must remain in the regulated area and that require special ventilation or enclosure requirements should be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.

3.1.6.3 PRE-CLEANING SURFACES IN THE REGULATED AREA

Pre-cleaning of ACM contaminated items shall be performed after the enclosure has been erected and negative pressure has been established in the work area.

Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

3.1.7 PRE-ABATEMENT ACTIVITIES

3.1.7.1 PRE-ABATEMENT MEETING

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

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

3.1.7.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS

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

- A. Conduct a space-by-space inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of AEQA 10-95 indicating the failure to identify asbestos in the areas listed as well as common issues when preparing specifications and contract documents. This is especially critical when demolition is planned, because AHERA surveys are non-destructive, and ACM may remain undetected. A NESHAPS (destructive) ACM inspection should be conducted on all building structures that will be demolished. Ensure the following areas are inspected on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside utility chases/walls; transite piping/ductwork/sheets; behind radiators; lab fume hoods; transite lab countertops; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawl spaces(previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; and steam line trench coverings.
- C. Ensure that all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects required to be removed from the regulated area have been cleaned and removed or properly protected from contamination. The VA is responsible for removing such items from the work area.
- D. If present and required, remove and dispose of carpeting from floors in the regulated area.
- E. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.7.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH/CIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the

VPIH/CIH and may require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved AHAP(s), especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.

- C. The CPIH/CIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification.

3.2 REMOVAL OF PIPING ACM

3.2.1 WETTING MATERIALS

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and OSHA's "wet methods" for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.
- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
- C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during disturbance equal to or greater than the amended water described above in B.

3.2.2 SECONDARY BARRIER AND WALKWAYS

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

3.2.3 WET REMOVAL OF ACM

- A. Using acceptable glovebag procedures, adequately and thoroughly wet the ACM to be removed prior to removal with amended water or when authorized by VA, removal encapsulant to reduce/prevent fiber release to the air. Adequate time (at a minimum two hours) must be allowed for the amended water or removal encapsulant to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be

sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except when authorized in writing by the VPIH/CIH and VA when a greater safety hazard (e.g., electricity) is present**

3.3 GLOVEBAG REMOVAL PROCEDURES

3.3.1 GENERAL

All applicable OSHA requirements and glovebag manufacturer's recommendations shall be met during glove bagging operations. In cases where live steam lines are present, the lines must be shut down prior to any work being performed on the system. **No abatement work shall be conducted on live, pressurized steam lines.** The Contractor may choose to use a High Temperature Glovebag in which a temperature rating ranges from 300°F to 700°F on steam lines that have recently been shut down and remain at high temperature for some time. In the case where a glovebag is not feasible, the Contractor will need to build a full negative pressure containment of sufficient size and follow all regulations as it pertains to removal.

1. Mix the surfactant with water in the garden sprayer, following the manufacturer's directions.
2. Have each employee put on a HEPA filtered respirator approved for asbestos and check the fit using the positive/negative fit check.
3. Have each employee put on a disposable full-body suit. Remember, the hood goes over the respirator straps.
4. Check closely the integrity of the glove bag to be used. Check all seams, gloves, sleeves, and glove openings. OSHA requires the bottom of the bag to be seamless.
5. Check the pipe where the work will be performed. If it is damaged (broken lagging, hanging, etc.), wrap the entire length of the pipe in poly sheeting and "candy stripe" it with duct tape.
6. Attach glovebag with required tools per manufacturer's instructions.
7. Using the smoke tube and aspirator bulb, test 10% of glovebags by placing the tube into the water porthole (two-inch opening to glove bag), and fill the bag with smoke and squeeze it. If leaks are found, they should be taped closed using duct tape and the bag should be retested with smoke.
8. Insert the wand from the water sprayer through the water porthole.
9. Insert the hose end from a HEPA vacuum into the upper portion of the glove bag.
10. Wet and remove the pipe insulation.
11. If the section of pipe is covered with an aluminum jacket, remove it first using the wire cutters to cut any bands and the tin snips to remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when placing it in the bottom.
12. When the work is complete, spray the upper portion of the bag and clean-push all residue into the bottom of the bag with the other waste material. Be very thorough. Use adequate water.
13. Put all tools, after washing them off in the bag, in one of the sleeves of glove bag and turn it inside out, drawing it outside of the bag. Twist the sleeve tightly several times to seal it and tape it several tight turns with duct tape. Cut through the middle of the

duct tape and remove the sleeve. Put the sleeve in the next glove bag or put it in a bucket of water to decontaminate the tools after cutting the sleeve open.

14. Turn on the HEPA vacuum and collapse the bag completely. Remove the vacuum nozzle, seal the hole with duct tape, twist the bag tightly several times in the middle, and tape it to keep the material in the bottom during removal of the glove bag from the pipe.
15. Slip a disposal bag over the glove bag (still attached to the pipe). Remove the tape securing the ends, and slit open the top of the glove bag and carefully fold it down into the disposal bag. Double bag and gooseneck waste materials.

3.3.2 NEGATIVE PRESSURE GLOVEBAG PROCEDURE

1. In addition to the above requirements, the HEPA vacuum shall be run continuously during the glovebag procedure until completion at which time the glovebag will be collapsed by the HEPA vacuum prior to removal from the pipe/component.
2. The HEPA vacuum shall be attached and operated as needed to prevent collapse of the glovebag during the removal process.

3.4 LOCKDOWN ENCAPSULATION

3.4.1 GENERAL

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

3.4.2 SEALING EXPOSED EDGES

Seal edges of ACM exposed by removal work with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant.

3.5 DISPOSAL OF ACM WASTE MATERIALS

3.5.1 GENERAL

Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Transport will be in compliance with 49 CFR 100-185 regulations. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.5.2 PROCEDURES

- A. The VA must be notified at least 24 hours in advance of any waste removed from the containment
- B. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged and wetted with amended water prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goosenecked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP's signs

must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.

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

3.6 PROJECT DECONTAMINATION

3.6.1 GENERAL

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

3.6.2 REGULATED AREA CLEARANCE

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

3.6.3 WORK DESCRIPTION

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

3.6.4 PRE-DECONTAMINATION CONDITIONS

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removed and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
 - 1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
 - 2. Decontamination facilities, if required for personnel and equipment in operating condition.

3.6.5 FIRST CLEANING

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

3.6.6 PRE-CLEARANCE INSPECTION AND TESTING

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

3.6.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification.

3.7 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING

3.7.1 GENERAL

Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH after the final cleaning.

3.7.2 FINAL VISUAL INSPECTION

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

3.7.3 FINAL AIR CLEARANCE TESTING

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final clearance testing. Air samples will be collected and analyzed in accordance with procedures for AHERA in this specification. If work is less than 260

1f/160 sf/35 cf, 5 PCM samples shall be collected for clearance and a minimum of one field blank. If work is equal to or more than 260 lf/160 sf/35 cf, AHERA TEM sampling shall be performed for clearance. TEM analysis shall be done in accordance with procedures for EPA AHERA in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. All additional inspection and testing costs will be borne by the Contractor.

- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.7.4 FINAL AIR CLEARANCE PROCEDURES

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured by the AHERA PCM protocol, or 70 AHERA structures per square millimeter (s/mm²) by AHERA TEM.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
 - 1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the AHERA TEM method.
 - 2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques except where soil is not encapsulated or enclosed. Samples will be collected on 0.8 μ MCE filters for PCM analysis and 0.45 μ Polycarbonate filters for TEM. A minimum of 1200 Liters of using calibrated pumps shall be collected for clearance samples. Before pumps are started, initiate aggressive air mixing sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.

3.7.5 CLEARANCE SAMPLING USING PCM

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

3.7.6 CLEARANCE SAMPLING USING TEM

- A. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.
- B. The TEM method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 13 clearance samples shall be collected. All samples must be equal to or less than 70 AHERA structures per square millimeter (s/mm²) AHERA TEM.

3.7.7 LABORATORY TESTING OF PCM SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the PCM air samples. The accredited laboratory shall be successfully participating in the AIHA Proficiency Analytical Testing (PAT) program. Samples will be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results will be furnished to the VA's representative and the Contractor.

3.7.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to a NIST accredited laboratory for analysis by TEM. The laboratory shall be successfully participating in the NIST Airborne Asbestos Analysis (TEM) program. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor

3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.8.1 COMPLETION OF ABATEMENT WORK

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area. Complete asbestos abatement work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

- A. Remove all equipment, materials, and debris from the project area.
- B. Package and dispose of all asbestos waste as required. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Transport will be in compliance with 49 CFR 100-185 regulations.
- C. Repair or replace all interior finishes damaged during the abatement work.
- D. The VA will be notified of any waste removed from the containment prior to 24 hours.
- E. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

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

3.8.3 WORK SHIFTS

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday - Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

3.8.4 RE-INSULATION

If required as part of the contract, replace all asbestos containing insulation with suitable non-asbestos material. Provide MSDS for all

replacement materials. Refer to Section 23 07 11, HVAC, PLUMBING, AND
BOILER PLANT INSULATION.

ATTACHMENT #

CERTIFICATE OF COMPLETION

DATE: _____ VA Project #: _____

PROJECT NAME: _____ Abatement Contractor: _____

VAMC/ADDRESS: _____

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

CPIH/CIH Signature/Date: _____

CPIH/CIH Print Name: _____

Abatement Contractor Signature/Date: _____

Abatement Contractor Print Name: _____

ATTACHMENT #

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

ABATEMENT CONTRACTOR'S NAME: _____

WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the owner for the above project requires that: You must be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You must be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You must receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

- Physical Characteristics and Background Information on Asbestos
- Potential Health Effects Related to Exposure to Asbestos
- Employee Personal Protective Equipment
- Establishment of a Respiratory Protection Program
- State of the Art Work Practices
- Personal Hygiene
- Additional Safety Hazards
- Medical Monitoring
- Air Monitoring
- Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
- Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and may have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature: _____

Printed Name: _____

Social Security Number: _____

Witness: _____

ATTACHMENT #3

AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND TRAINING/ACCREDITATION

VA PROJECT NAME AND NUMBER: _____

VA MEDICAL FACILITY: _____

ABATEMENT CONTRACTOR'S NAME AND ADDRESS: _____

1. I verify that the following individual

Name: _____ Social Security Number: _____

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

Address: _____

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.

3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.

4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH/CIH: _____ Date: _____

Printed Name of CPIH/CIH: _____

Signature of Contractor: _____ Date: _____

Printed Name of Contractor: _____

ATTACHMENT #4

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

VA Project Location: _____

VA Project #: _____

VA Project Description: _____

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature _____ Date _____

Abatement Contractor Competent Person(s) _____ Date _____

- - END- - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

- A. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:

- A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by Resident Engineer.
- B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.4 TOLERANCES:

- A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).
- B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.
- C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and - 6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).
- D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:
 - 1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.

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

1.5 REGULATORY REQUIREMENTS:

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

1.6 SUBMITTALS:

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

1.7 DELIVERY, STORAGE, AND HANDLING:

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

- B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement in suitable bins.
- C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

1.8 PRE-CONCRETE CONFERENCE:

- A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.
- B. Agenda: Includes but is not limited to:
 - 1. Submittals.
 - 2. Coordination of work.
 - 3. Availability of material.
 - 4. Concrete mix design including admixtures.
 - 5. Methods of placing, finishing, and curing.
 - 6. Finish criteria required to obtain required flatness and levelness.
 - 7. Timing of floor finish measurements.
 - 8. Material inspection and testing.
- C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; admixture manufacturers; Resident Engineer; Consulting Engineer; Department of Veterans Affairs retained testing laboratories for concrete testing and finish (F-number) verification.
- D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

1.9 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
 - 117-10.....Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - 211.1-91 (R2009).....Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

- 211.2-98 (R2004).....Standard Practice for Selecting Proportions for
Structural Lightweight Concrete
- 214R-11.....Guide to Evaluation of Strength Test Results of
Concrete
- 301-10.....Standard Practice for Structural Concrete
- 304R-00 (R2009).....Guide for Measuring, Mixing, Transporting, and
Placing Concrete
- 305.1-06.....Specification for Hot Weather Concreting
- 306.1-90 (R2002).....Standard Specification for Cold Weather
Concreting
- 308.1-11.....Specification for Curing Concrete
- 309R-05.....Guide for Consolidation of Concrete
- 318-11.....Building Code Requirements for Structural
Concrete and Commentary
- 347-04.....Guide to Formwork for Concrete
- SP-66-04.....ACI Detailing Manual
- C. American National Standards Institute and American Hardboard
Association (ANSI/AHA):
 - A135.4-2004.....Basic Hardboard
- D. American Society for Testing and Materials (ASTM):
 - A82/A82M-07.....Standard Specification for Steel Wire, Plain,
for Concrete Reinforcement
 - A185/185M-07.....Standard Specification for Steel Welded Wire
Reinforcement, Plain, for Concrete
 - A615/A615M-09.....Standard Specification for Deformed and Plain
Carbon Steel Bars for Concrete Reinforcement
 - A653/A653M-11.....Standard Specification for Steel Sheet, Zinc
Coated (Galvanized) or Zinc Iron Alloy Coated
(Galvannealed) by the Hot Dip Process
 - A706/A706M-09.....Standard Specification for Low Alloy Steel
Deformed and Plain Bars for Concrete
Reinforcement
 - A767/A767M-09.....Standard Specification for Zinc Coated
(Galvanized) Steel Bars for Concrete
Reinforcement
 - A775/A775M-07.....Standard Specification for Epoxy Coated
Reinforcing Steel Bars

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

A996/A996M-09.....Standard Specification for Rail Steel and Axle
Steel Deformed Bars for Concrete Reinforcement

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- C1107/1107M-11.....Standard Specification for Packaged Dry,
Hydraulic-Cement Grout (Non-shrink)
- C1315-11.....Standard Specification for Liquid Membrane
Forming Compounds Having Special Properties for
Curing and Sealing Concrete
- D6-95 (R2011).....Standard Test Method for Loss on Heating of Oil
and Asphaltic Compounds
- D297-93 (R2006).....Standard Methods for Rubber Products Chemical
Analysis
- D412-06AE2.....Standard Test Methods for Vulcanized Rubber and
Thermoplastic Elastomers - Tension
- D1751-04 (R2008).....Standard Specification for Preformed Expansion
Joint Filler for Concrete Paving and Structural
Construction (Non-extruding and Resilient
Bituminous Types)
- D4263-83 (2012).....Standard Test Method for Indicating Moisture in
Concrete by the Plastic Sheet Method.
- D4397-10.....Standard Specification for Polyethylene
Sheeting for Construction, Industrial and
Agricultural Applications
- E1155-96 (R2008).....Standard Test Method for Determining F_F Floor
Flatness and F_L Floor Levelness Numbers
- F1869-11.....Standard Test Method for Measuring Moisture
Vapor Emission Rate of Concrete Subfloor Using
Anhydrous Calcium Chloride.
- E. American Welding Society (AWS):
 - D1.4/D1.4M-11.....Structural Welding Code - Reinforcing Steel
- F. Concrete Reinforcing Steel Institute (CRSI):
 - Handbook 2008
- G. National Cooperative Highway Research Program (NCHRP):
 - Report On.....Concrete Sealers for the Protection of Bridge
Structures
- H. U. S. Department of Commerce Product Standard (PS):
 - PS 1.....Construction and Industrial Plywood
 - PS 20.....American Softwood Lumber
- I. U. S. Army Corps of Engineers Handbook for Concrete and Cement:
 - CRD C513.....Rubber Waterstops

CRD C572.....Polyvinyl Chloride Waterstops

PART 2 - PRODUCTS:

2.1 FORMS:

- A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.
- B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.
- C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.
- D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.
- E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 KPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.
- F. Form Lining:
 - 1. Hardboard: ANSI/AHA A135.4, Class 2 with one (S1S) smooth side)
 - 2. Plywood: Grade B-B Exterior (concrete-form) not less than 6 mm (1/4 inch) thick.
 - 3. Plastic, fiberglass, or elastomeric capable of reproducing the desired pattern or texture.
- G. Concrete products shall comply with following standards for biobased materials:

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

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

- H. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch)

diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150 Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33.
 - 1. Size 67 or Size 467 may be used for footings and walls over 300 mm (12 inches) thick.
 - 2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
 - 3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.
- D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150 μ m (No. 100) sieve.
- E. Mixing Water: Fresh, clean, and potable.
- F. Admixtures:
 - 1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
 - 2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
 - 3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
 - 4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
 - 5. Air Entraining Admixture: ASTM C260.

6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
7. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.
- G. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.
- H. Welded Wire Fabric: ASTM A185.
- I. Reinforcing Bars to be Welded: ASTM A706.
- J. Cold Drawn Steel Wire: ASTM A82.
- K. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.
- L. Expansion Joint Filler: ASTM D1751.
- M. Sheet Materials for Curing Concrete: ASTM C171.
- N. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315. Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.
- O. Moisture Vapor Emissions & Alkalinity Control Sealer: 100% active colorless aqueous silicate solution concrete surface.
 1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
 2. MVE 15-Year Warranty:
 - a. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Moisture Vapor Emissions & Alkalinity Control Sealer according to manufacturer's instruction, sealer manufacturer shall warrant the floor covering system against failure due to moisture vapor migration or moisture-born contaminates for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminates.

P. Non-Shrink Grout:

1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.

Q. Adhesive Binder: ASTM C881.

R. Waterstops:

1. Polyvinyl Chloride Waterstop: CRD C572.
2. Rubber Waterstops: CRD C513.
3. Bentonite Waterstop: Flexible strip of bentonite 25 mm x 20 mm (1 inch by 3/4 inch), weighing 8.7 kg/m (5.85 lbs. per foot) composed of Butyl Rubber Hydrocarbon (ASTM D297), Bentonite (SS-S-210-A) and Volatile Matter (ASTM D6).
4. Non-Metallic Hydrophilic: Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in in 70 deg water shall be 3 to 1 minimum.

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

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

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

2.3 CONCRETE MIXES:

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

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.

2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per m³ (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement -fly ash ratio, and consistency of each cylinder in terms of slump.
 3. Prepare a curve showing relationship between water-cement -fly ash ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
 4. If the field experience method is used, submit complete standard deviation analysis.
- B. Fly Ash Testing: Submit certificate verifying conformance with ASTM 618 initially with mix design and for each truckload of fly ash delivered from source. Submit test results performed within 6 months of submittal date. Notify Resident Engineer immediately when change in source is anticipated.
1. Testing Laboratory used for fly ash certification/testing shall participate in the Cement and Concrete Reference Laboratory (CCRL) program. Submit most recent CCRL inspection report.
- C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Resident Engineer or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. Resident Engineer may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and fly ash and approval of design mix.
- D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work. Increase this replacement to 40% for mass concrete, and reduce it to 10% for drilled piers and caissons.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

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

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

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

TABLE II - MAXIMUM SLUMP, MM (INCHES) *

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

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

concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

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

**TABLE III - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

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

- H. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.
- I. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).
- J. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III or Table IV.
- K. Enforcing Strength Requirements: Test during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, Resident Engineer may require any one or any combination of the following corrective actions, at no additional cost to the Government:

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

2.4 BATCHING AND MIXING:

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

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

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the Resident Engineer for consultation during batching, mixing, and placing operations of lightweight structural concrete. Services will be required until field controls indicate that concrete of required

quality is being furnished. Representative shall be thoroughly familiar with the structural lightweight aggregate, adjustment and control of mixes to produce concrete of required quality. Representative shall assist and advise Resident Engineer.

PART 3 - EXECUTION

3.1 FORMWORK:

- A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork, shores, and reshores.
 - 1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and Resident Engineer approves their reuse.
 - 2. Provide forms for concrete footings unless Resident Engineer determines forms are not necessary.
 - 3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.
- B. Treating and Wetting: Treat or wet contact forms as follows:
 - 1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
 - 2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
 - 3. Use sealer on reused plywood forms as specified for new material.
- C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.
- D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.
- E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to

same backing board. Nail lining at not over 200 mm (8 inches) on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.

- F. Architectural Liner: Attach liner as recommended by the manufacturer with tight joints to prevent leakage.
- G. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.
1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
 2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.
- H. Inserts, Sleeves, and Similar Items: Flashing reglets, steel strips, masonry ties, anchors, wood blocks, nailing strips, grounds, inserts, wire hangers, sleeves, drains, guard angles, forms for floor hinge boxes, inserts or bond blocks for elevator guide rails and supports, and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned, and built into construction, and maintained securely in place.
1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
 2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
 3. Do not install sleeves in beams, joists or columns except where shown or permitted by Resident Engineer. Install sleeves in beams,

joists, or columns that are not shown, but are permitted by the Resident Engineer, and require no structural changes, at no additional cost to the Government.

4. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
5. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.

I. Construction Tolerances:

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

3.2 PLACING REINFORCEMENT:

- A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.
- B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.
 1. Place reinforcing bars accurately and tie securely at intersections and splices with 1.6 mm (16 gauge) black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.

2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 150 mm (6 inches) in slabs on grade.
 3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.
- C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.
- D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
 2. Welded splices: Splicing by butt-welding of reinforcement permitted providing the weld develops in tension at least 125 percent of the yield strength (fy) for the bars. Welding conform to the requirements of AWS D1.4. Welded reinforcing steel conform to the chemical analysis requirements of AWS D1.4.
 - a. Submit test reports indicating the chemical analysis to establish weldability of reinforcing steel.
 - b. Submit a field quality control procedure to insure proper inspection, materials and welding procedure for welded splices.
 - c. Department of Veterans Affairs retained testing agency shall test a minimum of three splices, for compliance, locations selected by Resident Engineer.
 3. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and threaded sleeve. Exposed threads and swaging in the field not permitted.
 - a. Initial qualification: In the presence of Resident Engineer, make three test mechanical splices of each bar size proposed to be spliced. Department of Veterans Affairs retained testing laboratory will perform load test.

- b. During installation: Furnish, at no additional cost to the Government, one companion (sister) splice for every 50 splices for load testing. Department of Veterans Affairs retained testing laboratory will perform the load test.
- E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by Resident Engineer.
- F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.
- G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER:

- A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.
 - 1. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
 - 2. Vapor barrier joints lapped 150 mm (6 inches) and sealed with compatible waterproof pressure-sensitive tape.
 - 3. Patch punctures and tears.

3.4 CONSTRUCTION JOINTS:

- A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Resident Engineer.
- B. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.
- C. Place concrete for columns slowly and in one operation between joints. Install joints in concrete columns at underside of deepest beam or girder framing into column.

- D. Allow 2 hours to elapse after column is cast before concrete of supported beam, girder or slab is placed. Place girders, beams, grade beams, column capitals, brackets, and haunches at the same time as slab unless otherwise shown.

3.5 EXPANSION JOINTS AND CONTRACTION JOINTS:

- A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.
- B. Install polyvinyl chloride or rubber water seals, as shown in accordance with manufacturer's instructions, to form continuous watertight seal.
- C. Provide contraction (control) joints in floor slabs as indicated on the contract drawings. Joints shall be either formed or saw cut, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.6 PLACING CONCRETE:

- A. Preparation:
1. Remove hardened concrete, wood chips, shavings and other debris from forms.
 2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
 3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
 4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.
- B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
1. Preparing surface for applied topping:
 - a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
 - b. Broom clean and keep base slab wet for at least four hours before topping is applied.
 - c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve

the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

- C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of Resident Engineer.
- D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
 2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
 3. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
 4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
 5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
 6. On bottom of members with severe congestion of reinforcement, deposit 25 mm (1 inch) layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.
 7. Concrete on metal deck:
 - a. Concrete on metal deck shall be minimum thickness shown. Allow for deflection of steel beams and metal deck under the weight of wet concrete in calculating concrete quantities for slab.

- a. The Contractor shall become familiar with deflection characteristics of structural frame to include proper amount of additional concrete due to beam/deck deflection.
- E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.
1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
 2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.7 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.8 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.9 PROTECTION AND CURING:

- A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at

least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage 10m²/L (400 square feet per gallon) on steel troweled surfaces and 7.5m²/L (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.10 REMOVAL OF FORMS:

- A. Remove in a manner to assure complete safety of structure after the following conditions have been met.
 1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided concrete has hardened sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.
 2. Take particular care in removing forms of architectural exposed concrete to insure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.
- B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

- C. Reshoring: Reshoring is required if superimposed load plus dead load of the floor exceeds the capacity of the floor at the time of loading. Reshoring accomplished in accordance with ACI 347 at no additional cost to the Government.

3.11 CONCRETE SURFACE PREPARATION:

- A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.
- B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.
- C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.12 CONCRETE FINISHES:

A. Vertical and Overhead Surface Finishes:

1. Unfinished areas: Vertical and overhead concrete surfaces exposed in pipe basements, elevator and dumbwaiter shafts, pipe spaces, pipe trenches, above suspended ceilings, manholes, and other unfinished areas will not require additional finishing.
2. Interior and exterior exposed areas to be painted: Remove fins, burrs and similar projections on surfaces flush, and smooth by mechanical means approved by Resident Engineer, and by rubbing lightly with a fine abrasive stone or hone. Use ample water during rubbing without working up a lather of mortar or changing texture of concrete.
3. Interior and exterior exposed areas finished: Give a grout finish of uniform color and smooth finish treated as follows:
 - a. After concrete has hardened and laitance, fins and burrs removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone stone.
 - b. Apply grout composed of one part of Portland cement, one part fine sand, smaller than a 600 μm (No. 30) sieve. Work grout into surface of concrete with cork floats or fiber brushes until all pits, and honeycombs are filled.
 - c. After grout has hardened slightly, but while still plastic, scrape grout off with a sponge rubber float and, about 1 hour later, rub concrete vigorously with burlap to remove any excess grout remaining on surfaces.
 - d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish of area in same day. Make limits of finished areas at natural breaks in wall surface. Leave no grout on concrete surface overnight.
4. Textured: Finish as specified. Maximum quantity of patched area 0.2 m^2 (2 square feet) in each 93 m^2 (1000 square feet) of textured surface.

B. Slab Finishes:

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to

- establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.
2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
 3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
 4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
 5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
 6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.

7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.
10. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by Resident Engineer from sample panel.
11. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
 - a. Areas covered with carpeting, or not specified otherwise in b. below:
 - 1) Slab on Grade:

a) Specified overall value	FF 25/FL 20
b) Minimum local value	FF 17/FL 15
 - 2) Level suspended slabs (shored until after testing) and topping slabs:

a) Specified overall value	FF 25/FL 20
b) Minimum local value	FF 17/FL 15

- 3) Unshored suspended slabs:
 - a) Specified overall value FF 25
 - b) Minimum local value FF 17
 - 4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
 - b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:
 - 1) Slab on grade:
 - a) Specified overall value FF 36/FL 20
 - b) Minimum local value FF 24/FL 15
 - 2) Level suspended slabs (shored until after testing) and topping slabs
 - a) Specified overall value FF 30/FL 20
 - b) Minimum local value FF 24/FL 15
 - 3) Unshored suspended slabs:
 - a) Specified overall value FF 30
 - b) Minimum local value FF 24
 - 4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
 - c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.
 - d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.
12. Measurements
- a. Department of Veterans Affairs retained testing laboratory will take measurements as directed by Resident Engineer, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the

"as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by Department of Veterans Affairs retained testing laboratory.

- b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.
13. Acceptance/ Rejection:
- a. If individual slab section measures less than either of specified minimum local F_F/F_L numbers, that section shall be rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
 - b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected and remedial measures shall be required.
14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

3.13 SURFACE TREATMENTS:

- A. Use on exposed concrete floors and concrete floors to receive carpeting.
- B. Liquid Densifier/Sealer: Apply in accordance with manufacturer's directions just prior to completion of construction.
- C. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Broadcast aggregate uniformly over concrete surface at rate of application of 8% per 1/10th m^2 (7.5 percent per square foot) of

area. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water to slightly expose abrasive aggregate.

3.14 APPLIED TOPPING:

- A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 200 mm (8 inches) for concrete containing a high-range water-reducing admixture (superplasticizer) and 100 mm (4 inches) for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.
- B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

3.15 RESURFACING FLOORS:

Remove existing flooring areas to receive resurfacing to expose existing structural slab and extend not less than 25 mm (1 inch) below new finished floor level. Prepare exposed structural slab surface by roughening, broom cleaning, and dampening. Apply specified bonding grout. Place topping while the bonding grout is still tacky.

- - - E N D - - -

SECTION 04 05 13
MASONRY MORTARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Masonry mortar installed by concrete and masonry sections.

1.2 RELATED REQUIREMENTS

A. Mortar used in Section:

1. Section 03 45 00, PRECAST ARCHITECTURAL CONCRETE.
2. Section 04 05 16, MASONRY GROUTING.
3. Section 04 20 00, UNIT MASONRY.

B. Mortar Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. C40/C40M-11 - Organic Impurities in Fine Aggregates for Concrete.
2. C91/C91M-12 - Masonry Cement.
3. C144-11 -Aggregate for Masonry Mortar.
4. C150/C150M-15 - Portland Cement.
5. C207-06(2011) - Hydrated Lime for Masonry Purposes.
6. C270-14a - Mortar of Unit Masonry.
7. C595/C595M-15e1 - Blended Hydraulic Cements.
8. C780-15 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
9. C979/C979M-10 - Pigments for Integrally Colored Concrete.
10. C1329/C1329M-15 - Mortar Cement.

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Description of each product.

C. Test Reports: Certify each product complies with specifications.

1. Mortar.
2. Admixtures.

D. Certificates: Certify each product complies with specifications.

1. Portland cement.
2. Masonry cement.

3. Mortar cement.
4. Hydrated lime.
5. Fine aggregate.
6. Color admixture.

E. Qualifications: Substantiate qualifications comply with specifications.

1. Testing laboratory.

1.5 QUALITY ASSURANCE

A. Preconstruction Testing:

1. Engage independent testing laboratory to tests and submit reports.

- a. Deliver samples to laboratory in number and quantity required for testing.

2. Test mortar and materials specified.

3. Mortar:

- a. Test for compressive strength and water retention according to ASTM C270/C270M.

b. Minimum Mortar compressive strengths 28 days:

- 1) Type M: 17.2 MPa (2,500 psi).
- 2) Type S: 12.4 MPa (1,800 psi).
- 3) Type N: 5.1 MPa (750 psi).

4. Non Staining Cement: Test for water soluble alkali.

- a. Water Soluble Alkali: Maximum 0.03 percent.

5. Sand: Test for deleterious substances, organic impurities, soundness and grading.

1.6 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

A. Store masonry materials under waterproof covers on planking clear of ground.

1. Protect loose, bulk materials from contamination.

B. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hydrated Lime: ASTM C207/C207M, Type S.
- B. Aggregate for Masonry Mortar: ASTM C144/C144M and as follows:
 - 1. Light colored sand for mortar for laying face brick.
 - 2. White plastering sand meeting sieve analysis for mortar joints for pointing except that 100 percent passes No. 8 sieve, and maximum 5 percent retained on No. 16 sieve.
 - 3. Test sand for color value according to ASTM C40/C40M. Sand producing color darker than specified standard is unacceptable.
- C. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, IP.
- D. Masonry Cement: ASTM C91/C91M. Type N, S, Or M.
 - 1. Use white masonry cement whenever white mortar is specified.
- E. Mortar Cement: ASTM C1329/C1329M, Type N, S or M.
- F. Portland Cement: ASTM C150/C150M, Type I.
 - 1. Use white Portland cement wherever white mortar is specified.
- G. Pigments: ASTM C979/C979M; inorganic, inert, mineral pigments only, unaffected by atmospheric conditions, nonfading, alkali resistant, and water insoluble.
- H. Water: Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer and from one production run.

2.3 MIXES

- A. Pointing Mortar for New Work:
 - 1. For Precast Concrete: Proportion by volume; one part white Portland cement, two parts white sand, and 1/5 part hydrated lime.
- B. Masonry Mortar: ASTM C270/C270M.
 - 1. Admixtures:
 - a. Do not use mortar admixtures, and color admixtures unless approved by Contracting Officer's Representative.
 - b. Do not use antifreeze compounds.
- C. Colored Mortar:
 - 1. Maintain uniform mortar color for exposed work, throughout.
 - 2. Match mortar color in sample panel specified in Section 04 20 00, UNIT MASONRY.
- D. Color Admixtures:
 - 1. Proportion as specified by manufacturer.
 - 2. For color, see Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 MIXING

- A. Measure ingredients by volume using known capacity container.
- B. Mix for 3 to 5 minutes in a mechanically operated mortar mixer.
- C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
- D. Mortar Stiffened Because of Water Loss Through Evaporation:
 - 1. Re-temper by adding water to restore to proper consistency and workability.
 - 2. Discard mortar reaching initial set or unused within two hours of mixing.
- E. Pointing Mortar:
 - 1. Mix dry ingredients with enough water to produce damp mixture of workable consistency retaining shape when formed into ball.
 - 2. Allow mortar to stand in dampened condition for 60 to 90 minutes.
 - 3. Add water to bring mortar to a workable consistency before use.

3.3 MORTARING

- A. Type M Mortar: Use for precast concrete panels, and parging below grade.
- B. Type S Mortar: Use for masonry containing vertical reinforcing bars (non-engineered), masonry below grade and setting cast stone.
- C. Brick Veneer Over Frame Back Up Walls: Use Type S Portland cement-lime mortar.
- D. Type N Mortar: Use for other masonry work.
- E. Type N Mortar: Use for pointing items and tuck pointing specified.

3.4 FIELD QUALITY CONTROL

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
 - 1. Take and test samples during progress of work according to ASTM C780/C780M.

- - E N D - -

SECTION 04 05 16

MASONRY GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Grout for filling hollow concrete masonry cores.

1.2 RELATED WORK

- A. Section 04 20 00, UNIT MASONRY: Grout
- B. Section 04 72 00, CAST STONE MASONRY: Grout
- C. Section 09 06 00, SCHEDULE FOR FINISHES: Grout Color
- D. Section 09 30 13, CERAMIC/PORCELAIN TILING: Ready-Mixed Grout.
- E. Section 09 91 00, PAINTING

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section
American National Standards Institute (ANSI):
A118.6-19 -Standard Cement Grouts for Tile Installation.
- B. ASTM International (ASTM):
C40/C40M-20 -Organic Impurities in Fine Aggregates for
Concrete.
C150/C150M-20 -Portland Cement.
C207-18 -Hydrated Lime for Masonry Purposes.
C404-18 -Aggregates for Masonry Grout.
C476-20 -Grout for Masonry.
C595/C595M-20 -Blended Hydraulic Cement.
C979/C979M-16 -Pigments for Integrally Colored Concrete.
C1019-19 -Sampling and Testing Grout.

1.4 SUBMITTALS

- A. Submittal Procedures: 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. Manufacturer's Literature and Data:
 - 1. Description of each product.
- C. Test Reports: Certify each product complies with specifications.
 - 1. Grout, each type.
 - 2. Cement.
 - 3. Aggregate.
- D. Certificates: Certify each product complies with specifications.

1. Blended hydraulic cement.
2. Portland cement.
3. Grout.
4. Hydrated lime.
5. Aggregate.
6. Color admixture.

1.5 QUALITY ASSURANCE

A. Preconstruction Testing:

1. Engage independent testing laboratory to perform tests and submit reports.
 - a. Deliver samples to laboratory in number and quantity required for testing.
2. Grout:
 - a. Test compressive strength according to ASTM C1019 standard.
3. Aggregate:
 - a. Test for deleterious substances, organic impurities, soundness and grading.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.

1.7 STORAGE AND HANDLING

- A. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.
- B. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Grout Components:
 1. Hydrated Lime: ASTM C207, Type S.
 2. Aggregate For Masonry Grout: ASTM C404, Size 8.
 3. Blended Hydraulic Cement: ASTM C595, Type IS, IP.
 4. Portland Cement: ASTM C150, Type I.
 5. Liquid Acrylic Resin:

a. A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

6. Water: Potable, free of substances that are detrimental to grout, masonry, and metal.

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer and from one production run.

2.3 MIXES

A. Grout: ASTM C476; fine grout and coarse grout.

1. Color Admixture:

a. Pigments: ASTM C979, inert, stable to atmospheric conditions, nonfading, alkali resistant, and water insoluble.

b. Use mineral pigments only. Organic pigments are not acceptable.

B. Ready-Mixed Grout: ANSI A118.8.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Clean mortar from masonry cells protruding more than 13 mm (1/2 inch) to permit grout flow.

D. Remove debris from grout spaces.

E. Verify reinforcement is correctly placed before placing grout.

3.2 MIXING

A. Mix grout in mechanically operated mixer.

1. Mix grout for five minutes, minimum.

B. Measure ingredients by volume using container of known capacity.

C. Mix water with grout dry ingredients.

1. Slump Range: 200 to 275 mm (8 to 11 inches).

3.3 GROUTING

A. Install grout according to Section 04 20 00, UNIT MASONRY.

B. Use fine grout for filling wall cavities and hollow concrete masonry units where smallest cell dimension is 50 mm (2 inches) or less.

C. Use either fine grout or coarse grout for filling wall cavities and hollow concrete masonry units where smallest cell dimension is greater than 50 mm (2 inches).

D. Use grout for filling bond beam or lintel units.

- - E N D - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 04 20 00

UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry unit (CMU) assemblies for exterior walls.
2. Clay brick masonry unit assemblies for exterior walls.

1.2 RELATED REQUIREMENTS

- A. Sealants and Sealant Installation: Section 07 92 00, JOINT SEALANTS.
- B. Color and Texture of Masonry Units: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Concrete Institute (ACI):
 1. 315-99 - Details and Detailing of Concrete Reinforcement.
 2. 530.1/ASCE 6/TMS 602-13 - Specification for Masonry Structures.
- C. ASTM International (ASTM):
 1. A615/A615M-15a₁ - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 2. A951/A951M-14 - Steel Wire for Masonry Joint Reinforcement.
 3. A1064/A1064M-15 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 4. C34-13 - Structural Clay Load-Bearing Wall tile.
 5. C55-14a - Concrete Building Brick.
 6. C56-13 - Structural Clay Nonloadbearing Tile.
 7. C62-13a - Building Brick (Solid Masonry Units Made from Clay or Shale).
 8. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
 9. C90-14 - Load-Bearing Concrete Masonry Units.
 10. C126-15 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
 11. C216-15 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
 12. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
 13. C744-14 - Prefaced Concrete and Calcium Silicate Masonry Units.
 14. D1056-14 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 15. D2240-05(2010) - Rubber Property-Durometer Hardness.
 16. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.

- D. American Welding Society (AWS):
 - 1. D1.4/D1.4M-11 - Structural Welding Code - Reinforcing Steel.
- E. Brick Industry Association (BIA):
 - 1. TN 11B-88 - Guide Specifications for Brick Masonry, Part 3.
- F. Federal Specifications (Fed. Spec.):
 - 1. FF-S-107C (2) - Screws, Tapping and Drive.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Fabrication, bending, and placement of reinforcing bars. Comply with ACI 315. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.
- D. Samples:
 - 1. Face brick: Sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
- E. Certificates: Certify products comply with specifications.
 - 1. Face brick.

1.5 QUALITY ASSURANCE

- A. Welders and Welding Procedures Qualifications: AWS D1.4/D1.4M.
- B. Clay brick masonry mockup:
 - 1. Before starting masonry, build a mockup panel minimum 1800 mm by 1800 mm (6 feet by 6 feet) with 600 mm (24 inch) 90 degree return for outside corner.
 - a. Use masonry units from random cubes of units delivered on site.
 - b. Include structural backup, reinforcing, ties, and anchors.
 - 2. Mockup panel approved by Contracting Officer's Representative set workmanship and aesthetic quality for masonry work.
 - 3. Clean sample panel to test cleaning methods.
 - 4. Remove mockup panel when directed by Contracting Officer's Representative.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.

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

1.7 STORAGE AND HANDLING

- A. Store products above grade, protected from contamination.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Hot and Cold Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

- A. Brick Masonry Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
 - 1. Basis-of-Design information to contain brick type, color mix, and bonding pattern.
- B. Provide each product from one manufacturer and from one production run.

2.2 UNIT MASONRY PRODUCTS

- A. Brick:
 - 1. Face Brick:
 - a. ASTM C216, Grade SW, Type FBS.
 - b. Brick when tested according to ASTM C67: Classified slightly efflorescent or better.
 - c. Size:
 - 1) Modular.
 - 2. One Face Exposed: Grade S, Type I.
- B. Concrete Masonry Units (CMU):
 - 1. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.
 - a. Unit Weight: See Sheet S-001.
 - b. Fire rated units for fire rated partitions.
 - 2. Sizes: Modular, 200 mm by 400 mm (8 inches by 16 inches) nominal face dimension; thickness as indicated on drawings.
 - 3. For molded faces used as a finished surface, use concrete masonry units with uniform fine to medium surface texture unless specified otherwise.

4. Use bullnose concrete masonry units at corners exposed in finished work with 25 mm (1 inch) minimum radius rounded vertical exterior corners (bullnose units).

2.3 ANCHORS, TIES, AND REINFORCEMENT

- A. Steel Reinforcing Bars: ASTM A615/A615M; Grade 60, deformed bars.
- B. Joint Reinforcement:
 1. Form from wire complying with ASTM A951/A951M.
 2. Hot dipped galvanized after fabrication.
 3. Width of joint reinforcement 40 mm (1.6 inches) less than nominal thickness of masonry wall or partition.
 4. Cross wires welded to longitudinal wires.
 5. Joint reinforcement minimum 3000 mm (10 feet) long, factory cut.
 6. Joint reinforcement with crimp formed drip is not acceptable.
 7. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
 8. Ladder Design:
 - a. Longitudinal wires deformed 5 mm (0.20 inch) diameter wire.
 - b. Cross wires 4 mm (0.16 inch) diameter.
 9. Trussed Design:
 - a. Longitudinal and cross wires minimum 4 mm (0.16 inch nominal) diameter.
 - b. Longitudinal wires deformed.
- C. Adjustable Veneer Anchor for Framed and Concrete Masonry Unit Back Up Walls:
 1. Single-screw masonry tie with dual-diameter barrel with factory-installed EPDM washers at each end of the barrel.
 - a. Basis-Of-Design: Thermal Concrete 2-Seal Wing Nut Anchor by Hohmann & Barnard, Inc.
 - 1) Hook and Continuous Wire Finish: Type 304 stainless steel.
 - 2) Barrel and screw length to match depth of continuous cavity insulation.
 - 3) Hook/tie dimensions to match the distance required to effectively engage the clay brick masonry veneer.

2.4 ACCESSORIES

- A. Weeps:
 1. Weep Vents: Ninety-percent open-weave polyester mesh, sized to match the height and depth of a full brick head joint.

- B. Cavity Drain Material: Ninety-percent open-weave polyester sheets or strips to prevent mortar droppings from clogging the cavity. Material to be of a dovetail profile in elevation. Material to have insect barrier properties. Thickness to match air space thickness in all exterior wall types that involve brick veneer design.
- C. Preformed Compressible Joint Filler:
 - 1. Thickness and depth to fill joint.
 - 2. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
 - 3. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.
- D. Box Board:
 - 1. Mineral Fiber Board: ASTM C612, Class 1.
 - 2. 25 mm (1 inch) thickness.
 - 3. Other spacing material having similar characteristics is acceptable subject to Contracting Officer's Representative's approval.
- E. Masonry Cleaner:
 - 1. Detergent type cleaner selected for each type masonry.
 - 2. Acid cleaners are not acceptable.
 - 3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.
- F. Fasteners:
 - 1. Concrete Nails: ASTM F1667, Type I, Style 11, 19 mm (3/4 inch) minimum length.
 - 2. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
 - 3. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.
- G. Welding Materials: AWS D1.4/D1.4M, type to suit application.
- H. Metal Flashing: Type 304 Stainless Steel, 0.016 inch thick.
 - 1. Fabricate in complete sections wherever possible. Where joints are unavoidable, provide splice plates of smooth, formed metal flashing.
 - 2. Fabricate end dams in manufacturing or shop environments. Fully weld and grind all welds smooth.
 - 3. Extend outer bottom edge 1/2 inch out from wall face, with outer edge bent down 30 degrees.
- I. Embedded Flashing:
 - 1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 40 mil (1.0 mm) thick.

- J. Metal Drip Edge Flashing: Drip edge at bottom of embedded flashing. Fabricate from Type 304 stainless steel. Extend 3 inches into brick bed joint and 1/2 inch out from wall face, with outer edge bent down 30 degrees.
- K. Termination Bar for Embedded Flashing, Flanged: Stainless Steel, 1-1/2 inches tall with 3/8 inch flange at top and bottom. Sealant to be used to seal the top flange to the attached substrate.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Keep finish work free from mortar smears or spatters, and leave neat and clean.
- C. Wall Openings:
 - 1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
 - 2. When items are not available when walls are built, prepare openings for subsequent installation.
- D. Tooling Joints:
 - 1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
 - 2. Tool while mortar is soft enough to be compressed into joints and not raked out.
 - 3. Finish joints in exterior face masonry work with jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
 - 4. Tool Exposed interior joints in finish work concave unless specified otherwise.
- E. Lintels:
 - 1. Lintels are not required for openings less than 1000 mm (40 inches) wide that have hollow metal frames.

2. Openings 1025 mm (41 inches) wide to 1600 mm (63 inches) wide without structural steel lintel or frames, require lintel formed of concrete masonry lintel or bond beam units filled with grout and reinforced with one No. 16 (No. 5) rod top and bottom for each 100 mm (4 inches) of nominal thickness unless shown otherwise.
 3. Use steel lintels, for openings greater than 1600 mm (63 inches) wide, brick masonry openings, and elevator openings unless shown otherwise.
 4. Doors having overhead concealed door closers require steel lintel, and pocket for closer box.
 5. Lintel Bearing Length: Minimum 100 mm (4 inches) at both ends.
 6. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.
- F. Wall, Furring, and Partition Units:
1. Lay out field units to provide one-half running bond, unless indicated otherwise.
 2. Align head joints of alternate vertical courses.
 3. At sides of openings, balance head joints in each course on vertical center lines of openings.
 4. Minimum Masonry Unit Length: 100 mm (4 inches).
 5. Do not abut existing plastered surfaces except suspended ceilings with new masonry partitions.
- G. Use minimum 100 mm (4 inches) nominal thick masonry for fireproofing steel columns unless indicated otherwise.
- H. Before connecting new masonry with previously laid masonry, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.
- I. When new masonry partitions start on existing floors, machine cut existing floor finish material down to concrete surface.
- J. Structural Steel Encased in Masonry:
1. Where structural steel is encased in masonry and voids between steel and masonry are filled with mortar, provide minimum 25 mm (1 inch) mortar free expansion space between masonry and steel by applying box board material to steel before masonry is laid.
 2. Do not install spacing material where steel is bearing on masonry or masonry is bearing on steel.

K. Wetting and Wetting Test:

1. Test and wet brick and clay tile according to BIA TN 11B.
2. Do not wet concrete masonry units or glazed structural facing tile before laying.

L. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

M. Construct formwork to conform to shape, line and dimensions indicated on drawings. Make sufficiently tight to prevent mortar, grout, or concrete leakage. Brace, tie, and support formwork as required to maintain position and shape during construction and curing of reinforced masonry.

N. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other reasonable temporary construction loads.

O. Minimum Curing Times Before Removing Shores and Forms:

1. Girders and Beams: 10 days.
2. Slabs: 7 days.
3. Reinforced Masonry Soffits: 7 days.

3.2 INSTALLATION - ANCHORAGE

A. Veneer to Framed Walls:

1. Install adjustable veneer anchors.
2. Fasten anchor to stud through sheathing with self-drilling and tapping screw, one at both ends of loop type anchor. Drill to the depth recommended by the manufacturer in respect to insulation depth.
3. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

B. Veneer to Concrete Masonry Unit Walls:

1. Install adjustable veneer anchors.
2. Pre-drill a 5/32 inch diameter hole into the CMU for every anchor. Pre-drill to the depth recommended by the manufacturer in respect to insulation depth.
3. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

3.3 INSTALLATION - REINFORCEMENT

A. Joint Reinforcement:

1. Install joint reinforcement in CMU wythe of combination brick and CMU, cavity walls, and single wythe concrete masonry unit walls or partitions.
2. Reinforcing is acceptable in lieu of individual ties for anchoring brick facing to CMU backup in exterior masonry walls.
3. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.
4. Additional joint reinforcement is required in mortar joints at both 200 mm (8 inches) and 400 (16 inches) above and below windows, doors, louvers, and similar openings in masonry.

B. Steel Reinforcing Bars:

1. Install reinforcing bars in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for horizontal reinforcement. Install in wall cavities of reinforced masonry walls where indicated on drawings.
2. Bond Beams:
 - a. Form Bond beams of load-bearing concrete masonry units filled with grout and reinforced with two No. 15m (No. 5) reinforcing bars unless shown otherwise. Do not cut reinforcement.
 - b. Brake bond beams only at expansion joints and at control joints, if shown.
3. Stack Bond:
 - a. Locate additional joint reinforcement in vertical and horizontal joints as indicated on drawings.
 - b. Anchor vertical reinforcement into foundation or wall or bond beam below.
 - c. Provide temporary bracing for walls over 8 feet tall until permanent horizontal bracing is completed.
4. Grout openings:
 - a. Leave cleanout holes in double wythe walls during construction by omitting units at base of one side of wall.
 - b. Locate 75 mm by 75 mm (3 inches. by 3 inches.) min. cleanout holes at location of vertical reinforcement.
 - c. Keep grout space clean of mortar accumulation and debris. Clean as work progresses and immediately before grouting.

3.4 INSTALLATION - BRICK EXPANSION AND CMU CONTROL JOINTS

- A. Provide brick expansion control joint (CJ) where indicated on drawings.

- B. Keep joint free of mortar and other debris.
- C. Joints occur in masonry walls:
 - 1. Install preformed compressible joint filler in brick wythe.
- D. Interrupt joint reinforcement at expansion control joints.
- E. Fill opening in exposed face of expansion control joints with sealant and closed-cell backer rod as specified in Section 07 92 00, JOINT SEALANTS.

3.5 INSTALLATION - ISOLATION JOINT

- A. Where full height walls and partitions lie parallel or perpendicular to and under structural beams and shelf angles, provide minimum 9 mm (3/8 inch) separation between walls and partitions and bottom of beams and shelf angles.
- B. Insert continuous full width strip of non-combustible type compressible joint filler.
- C. Fill opening in exposed face of isolation joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.6 INSTALLATION - BRICKWORK

- A. Lay clay brick according to BIA TN 11B.
- B. Laying:
 - 1. Lay brick in one-half running bond with bonded corners, unless indicated otherwise.
 - 2. Maintain bond pattern throughout.
 - 3. Do not use brick smaller than half-brick at any angle, corner, break, and jamb.
 - 4. Where length of cut brick is greater than one half length, maintain vertical joint location.
 - 5. Lay exposed brickwork joints symmetrical about center lines of openings.
 - 6. Do not structurally bond multi-wythe brick walls, unless indicated on drawings.
 - 7. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
 - 8. Lay brick for sills with wash and drip.
 - 9. Build solid brickwork as required for anchorage of items.
- C. Joints:
 - 1. Exterior And Interior Joint Widths: Lay for three equal joints in 200 mm (8 inches) vertically, unless shown otherwise.

2. Rake joints for pointing with colored mortar when colored mortar is not full depth.
3. Arches:
 - a. Flat arches (jack arches) lay with camber of 1 in 200 (1/16 inch per foot) of span.
 - b. Face radial arches with radial brick with center line of joints on radial lines.
 - c. Form Radial joints of equal width.
 - d. Bond arches into backing with metal ties in every other joint.
- D. Metal Flashing:
 1. Install metal flashing at all window sill conditions that involve brick masonry.
 2. Provide end dams at each side of each window sill condition.
 3. Seal all required penetrations of the metal flashing, whether fasteners or masonry reinforcement, with the appropriate sealant in SECTION 07 92 00 JOINT SEALANTS.
- E. Embedded Flashing:
 1. Install embedded flashing at base of all exterior brick veneer walls. Flashing shall be continuous at one brick course above First Floor elevation of +100'-0".
 2. Install embedded flashing at exterior masonry veneer over bond beams and other water stops in wall. Flashing shall be continuous immediately at the top of opening or bottom of obstruction.
 3. Install embedded flashing over metal drip edge flashing.
 4. Install termination bar at the top of the embedded flashing. Termination bars shall be continuous. Install bars at 6 inches, minimum, above the topmost edge of the continuous cavity drain material.
 5. Install cavity drain material on top of the embedded flashing surface, friction fit into the wall air space.
- F. Weep Vents:
 1. Install weep vents at 600 mm (24 inches) on center in vertical head joints of exterior masonry veneer or cavity wall facing over bond beams and other water stops in wall.
 2. Install weep vents at 600 mm (24 inches) on center in vertical head joints of exterior masonry veneer or cavity wall facing immediately at embedded flashing.

3. Install weep vents at 600 mm (24 inches) on center in vertical head joints of exterior masonry veneer or cavity wall facing in the third row down from the uppermost brick coursing. The elevation of these high weep vents will vary according to the respective wall height.
4. All weep vents to be friction fit.

G. Cavity Walls:

1. Veneer Framed and CMU Walls:
 - a. Build with 100 mm (4 inches) of face brick over back up wall with insulation and air space.
 - b. Keep air space clean of mortar accumulations and debris.

3.7 POINTING

- A. Fill joints with pointing mortar using rubber float trowel to apply mortar solidly into raked joints.
- B. Wipe off excess mortar from joints of glazed masonry units with dry cloth.
- C. Tool exposed joints to smooth concave joint.
- D. At joints with existing work, match existing joint.

3.8 GROUTING

- A. Preparation:
 1. Clean grout space of mortar droppings before placing grout.
 2. Close cleanouts.
 3. Install vertical solid masonry dams across grout space for full height of wall at intervals of maximum 9000 mm (30 feet). Do not bond dam units into wythes as masonry headers.
 4. Verify reinforcing bars are installed as indicated on drawings.
- B. Placing:
 1. Place grout in grout space in lifts as specified.
 2. Consolidate each grout lift after free water has disappeared but before plasticity is lost.
 3. Do not slush with mortar or use mortar with grout.
 4. Interruptions:
 - a. When grouting must be stopped for more than an hour, top off grout 40 mm (1-1/2 inches) below top of last masonry course.
 - b. Grout from dam to dam on high lift method.
 - c. Longitudinal run of masonry may be stopped off only by raking back one-half masonry unit length in each course and stopping grout 100 mm (4 inches) back of rake on low lift method.

C. Puddling Method:

1. Consolidate by puddling with grout stick during and immediately after placing.
2. Grout cores of concrete masonry units containing reinforcing bars solid as masonry work progresses.

D. Low Lift Method:

1. Construct masonry to 1.5 m (5 feet) maximum height before grouting.
2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

E. High Lift Method:

1. Do not pour grout until masonry wall has cured minimum of 4 hours.
2. Place grout in 1.5 m (5 feet) maximum lifts.
3. Exception:
 - a. Where following conditions are met, place grout in 3.86 m (12.67 feet) maximum lifts.
 - b. Masonry has cured minimum of 4 hours.
 - c. Grout slump is maintained between 250 and 275 mm (10 and 11 inches).
 - d. No intermediate reinforced bond beams are placed between top and bottom of grout lift.
4. When vibrating succeeding lifts, extend vibrator 300 to 450 mm (12 to 18 inches) into preceding lift.

3.9 PLACING REINFORCEMENT

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice, or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or approved submittal drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Position reinforcement accurately at spacing indicated on drawings. Support and secure vertical bars against displacement. Install horizontal reinforcement as masonry work progresses. Where vertical bars are shown in close proximity, provide clear distance between bars of minimum one bar diameter or 25 mm (1 inch), whichever is greater.
- C. For columns, piers and pilasters, maintain clear distance between vertical bars as indicated on drawings, minimum 1.5 bar diameters or 38 mm (1-1/2 inches), whichever is greater. Provide lateral ties as indicated on drawings.

- D. Splice reinforcement bars only where indicated on drawings, unless approved by Contracting Officer's Representative. Provide lapped splices. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
- E. Provide minimum lap as indicated on approved submittal drawings, or if not indicated, minimum 48 bar diameters.
- F. Weld splices where indicated on drawings according to AWS D1.4/D1.4M.
- G. Embed metal ties in mortar joints as work progresses, with minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.
- H. Embed prefabricated horizontal joint reinforcement as work progresses, with minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement minimum 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- I. Anchoring: Anchor reinforced masonry work to supporting structure as indicated on drawings.
- J. Anchor reinforced masonry walls at intersections with non-reinforced masonry.

3.10 INSTALLATION OF REINFORCED BRICK MASONRY

- A. Mortar Jointing and Bedding:
 - 1. Pattern Bond: Lay exterior wythes in pattern bond shown, or if not shown, lay in 1/2 running bond with vertical joints in each course centered on units in courses above and below. Lay inner wythes (if any) with units in each wythe bonded by lapping minimum 50 mm (2 inches). Bond and interlock each course of each wythe at corners and intersections. Do not use units with less than 100 mm (4 inch) nominal horizontal face dimension at corners or jambs.
 - 2. Lay exterior wythes with bed (horizontal) and head (vertical) joints between units completely filled with mortar. Top of bed joint mortar may be sloped toward center of walls. Butter ends of units with sufficient mortar to completely fill head joints and shove into place. Do not furrow bed joints or slush head joints. Remove any mortar fins which protrude into grout space.

3. Maintain joint widths shown for head and bed joints, except for minor variations required to maintain pattern bond. If not shown, lay with 9 mm (3/8 inch) head and bed joints.
 4. Maintain joint widths shown for head and bed joints, but adjust thickness of bed joints, if required, to allow for minimum 6 mm (1/4 inch) thickness of mortar between reinforcement and masonry units, except 6 mm (1/4 inch) bars (if any) may be laid in 13 mm (1/2 inch) thick bed joints and 5 mm (0.2 inch) diameter or smaller wire reinforcing may be laid in 9 mm (3/8 inch) thick bed joints.
- B. Limit extent of masonry construction to sections which do not exceed maximum grouting requirements. Provide temporary dams or barriers to control horizontal flow of grout at ends of wall sections. Build dams full height of grout pour. If masonry units are used, do not bond into permanent masonry wythes. Remove temporary dams after completion of grout pour.
- C. Low-Lift Grouting:
1. Use Low-Lift grouting technique with fine grout for the following:
 - a. Columns, piers or pilasters where masonry units are shown in core areas enclosed by exterior masonry units.
 2. At Contractor's option, low-lift grouting technique is acceptable for reinforced masonry construction with grout spaces wider than 50 mm (2 inches), except use coarse grout and place in lifts maximum 200 mm (8 inches) in height.
 3. Construct low-lift masonry by placing reinforcement, laying masonry units, and pouring grout as work progresses.
 4. Place vertical reinforcement bars and supports before laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Horizontal reinforcement bars may be placed progressively with laying of masonry units.
 5. Limit grout pours as required to prevent displacement of masonry by grout pressures (blowout), but do not exceed 1200 mm (4 feet) pour height.
 6. Lay masonry units before each grout pour, but do not construct more than 300 mm (12 inches) above maximum grout pour height in exterior wythe and 100 mm (4 inches) above in other exterior wythe. Provide metal wall ties if required to prevent blowouts.

7. Consolidate immediately by rodding or puddling; do not use trowels. Place grout continuously; do not interrupt pouring of grout for more than one hour. If poured in lifts, place from center-to-center of masonry courses. Terminate pour 38 mm (1 1/2 inches) below top of highest course in pour.

D. High-Lift Grouting:

1. High-Lift grouting technique is acceptable for the following masonry construction:
 - a. Two-wythe walls with grout spaces of 60 mm (2 1/2 inches) or greater width.
 - b. Columns, piers, or pilasters when no unit masonry fill is shown to be placed in reinforced grout space.
2. Place reinforcement and support in proper position, before laying of masonry units, except if shown to be placed in mortar joints, place as masonry units are laid. Place horizontal bars in grout spaces on same side of vertical bars.
3. Construct high-lift masonry by laying masonry to full height and width before placing grout. Provide cleanout holes in first course of masonry, and use high-pressure water jet stream to remove excess mortar from grout spaces, reinforcement bars and top surface of structural members which support wall. Clean grout spaces daily during construction of masonry.
4. Walls: Omit every other masonry unit in first course of one wythe to provide cleanout holes. Tie wythes together with metal ties as indicated on drawings or as required by code, but provide minimum 3.8 mm diameter (9 gage) wire ties spaced maximum 600 mm (24 inches) on center horizontally and 400 mm (16 inches) on center vertically for running pattern bond or 300 mm (12 inches) on center vertically for stack bond (if any).
5. Columns, Piers and Pilasters: Omit every other masonry unit around perimeter of member to provide cleanout holes. Provide reinforcing bands placed in bed joints as the masonry work progresses. Provide bands of the size and vertical spacing show, or as required by code, but minimum 3.8 mm diameter (9 gage) wire spaced 300 mm (12 inches) on center vertically.

6. Preparation of Grout Spaces: Before grouting, inspect and clean grout spaces. Remove dirt, dust, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper positioning. Clean top surface of structural members supporting masonry to ensure bond. After cleaning and inspection, close cleanout holes with matching masonry units and brace closures to resist grout pressures.
7. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure, but minimum 3 days curing time. Install shores and bracing, if required, before starting grouting operations.
8. Place grout by pumping into grout spaces, unless alternate methods are acceptable to Contracting Officer's Representative.
9. Install coarse grout. Rod or vibrate each grout lift during placing and after excess moisture has been absorbed, but before plasticity is lost. Do not penetrate or damage grout placed in previous lifts or pours.
10. Limit grout pours to sections which can be completed in one working day with maximum one hour interruption of pouring operation. Limit pours so as not to exceed the capacity of masonry to resist displacement or loss of mortar bond due to grout pressures.
11. Do not exceed 3600 mm (12 feet) pour height.
12. Do not exceed 7600 mm (25 feet) horizontal pour dimension.
13. Where pour height exceeds 1200 mm (4 feet), place grout in series of lifts not exceeding 1200 mm (4 feet) height. Place each lift as continuous pouring operation. Allow minimum 30 minutes and maximum one hour between lifts of given pour.
14. When more than one pour is required to complete each section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 38 mm (1-1/2 inches) of top course of first pour. After grouted masonry is cured, remove temporary dams, and lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence, if more pours are required.

3.11 CONSTRUCTION TOLERANCES

- A. Lay masonry units plumb, level and true to line within tolerances according to ACI 530.1/ASCE 6/TMS 602 and as follows:

- B. Maximum variation from plumb:
 - 1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
 - 2. In 6000 mm (20 feet) - 9 mm (3/8 inch).
 - 3. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).
- C. Maximum variation from level:
 - 1. In any bay or up to 6000 mm (20 feet) - 6 mm (1/4 inch).
 - 2. In 12,000 mm (40 feet) or more - 13 mm (1/2 inch).
- D. Maximum variation from linear building lines:
 - 1. In any bay or up to 6000 mm (20 feet) - 13 mm (1/2 inch).
 - 2. In 12,000 mm (40 feet) or more - 19 mm (3/4 inch).
- E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:
 - 1. Minus 6 mm (1/4 inch).
 - 2. Plus 13 mm (1/2 inch).
- F. Maximum variation in prepared opening dimensions:
 - 1. Accurate to minus 0 mm (0 inch).
 - 2. Plus 6 mm (1/4 inch).

3.12 CLEANING AND REPAIR

- A. General:
 - 1. Clean exposed masonry surfaces on completion.
 - 2. Protect adjoining construction materials and landscaping during cleaning operations.
 - 3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
 - 4. Remove mortar droppings and other foreign substances from wall surfaces.
- B. Brickwork:
 - 1. First wet surfaces with clean water, then wash down with detergent solution. Do not use muriatic acid.
 - 2. Brush with stiff fiber brushes while washing, and immediately wash with clean water.
 - 3. Remove traces of detergent, foreign streaks, or stains of any nature.

- - E N D - -

SECTION 04 72 00
CAST STONE MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured concrete units to simulate a natural stone.
- B. Installation of cast stone units.

1.2 RELATED WORK

- A. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS
- B. Section 04 05 13, MASONRY MORTARING, Setting and pointing mortar.
- C. Section 04 05 16, MASONRY GROUTING, Setting and pointing mortar.
- D. Section 04 20 00, UNIT MASONRY, for similar construction methods.
- E. Section 07 92 00, JOINT SEALANTS, Joint sealant, and application.
- F. Section 09 06 00, SCHEDULE FOR FINISHES, Color and texture.

1.3 SUBMITTALS

- A. Submit in accordance with 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. Samples:
 - 1. Cast stone, sample panel, size 100 by 300 by 300 mm (4 by 12 by 12 inches) each color and finish.
 - 2. Show finish on two 100 mm (4-inch) edges and 300 by 300 mm (12 by 12 inch) surface.
- C. Shop Drawings:
 - 1. Cast stone showing exposed faces, profiles, cross sections, anchorage, reinforcing, jointing and sizes.
 - 2. Setting drawings with setting mark.
- D. Certificates: Test results indicating that the cast stone meets specification requirements and proof of plant certification.
- E. Submit manufacturers test results of cast stone previously made by manufacturer.
- F. Laboratory Data: Description of testing laboratories facilities and qualifications of its principals and key personnel.
- G. List of jobs furnished by the manufacturer, which were similar in scope and at least three (3) years of age.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store cast stone under waterproof covers on planking clear of ground.
- B. Protect from handling, dirt, stain, and water damage.
- C. Mark production units with the identification marks as shown on the shop drawings.
- D. Package units and protect them from staining or damage during shipping and storage.
- E. Provide an itemized list of products to support the bill of lading.

1.5 WARRANTY

- A. Warranty exterior masonry walls against moisture leaks, any defects and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be two years.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. Cast Stone Institute Technical Manual and Cast Stone Institute standard specifications.
- C. ASTM International (ASTM):
 - A167-99(R2009).....Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 - A615/A615M-20.....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
 - 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
 - C150/C150M-20.....Standard Specification for Portland Cement
 - C503/C503M-15.....Standard Specification for Marble Dimension Stone (Exterior)
 - C568/C568M-15.....Standard Specification for Limestone Dimension Stone
 - C615/C615M-18e1.....Standard Specification for Granite Dimension Stone
 - C616/C616M-15.....Standard Specification for Quartz-Based Dimension Stone

C979/C979M-16.....Standard Specification for Pigments for
Integrally Colored Concrete
C1194-19.....Standard Test Method for Compressive Strength
of Architectural Cast Stone
C1195-19a.....Standard Test Method for Absorption of
Architectural Cast Stone
C1364-19.....Standard Specification for Architectural Cast
Stone.
D2244-16.....Standard Practice for Calculation of Color
Differences from Instrumentally Measured Color
Coordinates.

1.7 QUALITY ASSURANCE

A. The Manufacturer:

1. Must have 5 years minimum continuous operating experience and have facilities for manufacturing cast stone as described herein. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of cast stone required in accordance with the project schedule.
2. Must be a member of the Cast Stone Institute.
3. Must have a certified plant (certification by the Cast Stone Institute).

B. Stone setter: Must have 5 years' experience setting cast or natural building stone.

C. Testing: One (1) sample from production units may be selected at random from the field for each 500 cubic feet (14 meters squared) delivered to the job:

1. Three (3) field cut cube specimens from each of these sample shall have an average minimum compressive strength of not less than 85 percent with no single specimen testing less than 75 percent of design strength as specified.
2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6 percent.
3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.
4. Manufacturer shall submit a written list of projects similar and at least three (3) years of age, along with owner, architect, and contractor references.

1.8 MANUFACTURING TOLERANCES

- A. Cross section dimensions shall not deviate by more than + 1/8 inch (3 mm) from approved dimension.
- B. Length of units shall not deviate by more than length /360 or + 1/8 inch (3mm), whichever is greater, not to exceed + 1/4 inch (6 mm). Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
- C. Warp bow or twist of units shall not exceed length/360 or + 1/8 inch (3 mm), whichever is greater.
- D. Location of dowel holes, anchor slots, flashing grooves, false joints, and similar features - On formed sides of unit, 1/8 inch (3 mm), on unformed sides of unit, 3/8 inch (9 mm) maximum deviation.

1.9 MOCK-UP

- A. Provide full size unit(s) for use in construction of sample wall. The mock-up becomes the standard of workmanship for the project. The cast stone units will be components of the clay brick masonry mock-up wall.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CAST STONE

- A. Cast Stone Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
 - 1. Basis-of-Design information to contain stone color and stone surface texture.
 - 2. Provide each product from one manufacturer and from one production run.
- B. Comply with ASTM C 1364
- C. Physical properties: Provide the following:
 - 1. Compressive Strength - ASTM C 1194: 6,500 psi (45 Mpa) minimum for products at 28 days.
 - 2. Absorption - ASTM C 1195: 6 percent maximum by the cold water method, or 10 percent maximum by the boiling method for products as 28 days.
 - 3. Air Content - ASTM C173 or C231, for wet cast product shall be 4-8 percent for units exposed to freeze-thaw environments. Air entrainment is not required for vibrant dry tamp (VDT) products.
 - 4. Freeze thaw - ASTM C 1364L, the cumulative percent weight loss (CPWL) shall be less than 5 percent after 300 cycles of freezing and thawing.
 - 5. Linear Shrinkage - ASTM C 426L Shrinkage shall not exceed 0.065 percent.

D. Job site testing - One (1) sample from production units may be selected at random from the field for each 500 cubic feet (14 cubic meters) delivered to the job site:

1. Three (3) field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85 percent with no single specimen testing less than 75 percent of design strength as allowed by ACI 318.
2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6 percent.
3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.
4. Vibrant dry tamp (VDT) casting method is not accepted.

2.2 RAW MATERIALS

- A. Portland cement - Type I or Type III, white and/or grey, ASTM C 150.
- B. Coarse aggregates - Granite, quartz or limestone, ASTM C 33, except for gradation.
- C. Fine aggregates - Manufactured or natural sands, ASTM C 33, except for gradation.
- D. Colors - Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.
- E. Admixtures- Comply with the following:
 1. ASTM C 260 for air-entraining admixtures.
 2. ASTM C 494/C 495 M Types A-G for water reducing, retarding, accelerating and high range admixtures.
 3. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
 4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
 5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
- F. Water - Potable
- G. Reinforcing bars:
 1. ASTM A 615/A 615M. Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 inch (37 mm).
 2. Welded Wire Fabric: ASTM A 1064 where applicable for wet cast units.

- H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

2.3 COLOR AND FINISH

- A. Match sample on file and refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch (0.8 mm) and the density of such voids shall be less than 3 occurrences per any 1 inch (25 mm) and not obvious under direct daylight illumination at a 5 feet (1.5 meters) distance.
- C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 feet (3 meters) distance.
- D. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
1. Total color difference - not greater than 6 units.
 2. Total hue difference-not greater than 2 units.

2.4 REINFORCING

- A. Reinforce the units as required by the drawings and for safe handling and structural stress.
1. Minimum reinforcing shall be 0.25 percent of the cross section area.
- B. Reinforcement shall be non-corrosive where faces exposed to weather are covered with less than 1.5inch (38 mm) of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.
- C. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20 foot (6 meter) distance.
- D. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.
- E. Remove cement film, if required, from exposed surface prior to packaging for shipment.

2.5 ANCHORS, TIES, AND REINFORCEMENT

- A. Adjustable Veneer Anchor for Framed and Concrete Masonry Unit Back Up Walls:

1. Single-screw masonry tie with dual-diameter barrel with factory-installed EPDM washers at each end of the barrel.
 - a. Basis-Of-Design: Thermal Concrete 2-Seal Wing Nut Anchor by Hohmann & Barnard, Inc.
 - b. Hook and Continuous Wire Finish: Type 304 stainless steel.
 - c. Barrel and screw length to match depth of continuous cavity insulation.
 - d. Hook/tie dimensions to match the distance required to effectively engage the clay brick masonry veneer.
- B. Provide other miscellaneous anchors and ties that are specific to the manufacturer's standards according to specific condition.

2.6 CURING

- A. Cure units in a warm curing chamber 100 degrees F (37.8 degrees C) at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 70 degrees F (21.1 degrees C) for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350-degree-days (i.e. 7 days @ 50 degrees F (10.0 degrees C) or 5 days @ 70 degrees F (21.0 degrees C) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

2.7 ACCESSORIES

- A. Weeps:
 1. Weep Vents: Ninety-percent open-weave polyester mesh, sized to match the height and depth of a full brick head joint.
- B. Cavity Drain Material: Ninety-percent open-weave polyester sheets or strips to prevent mortar droppings from clogging the cavity. Material to be of a dovetail profile in elevation. Material to have insect barrier properties. Thickness to match air space thickness in all exterior wall types that involve brick veneer design.
- C. Preformed Compressible Joint Filler:
 1. Thickness and depth to fill joint.
 2. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
 3. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.
- D. Masonry Cleaner:
 1. Detergent type cleaner selected for each type masonry.
 2. Acid cleaners are not acceptable.
 3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.

- E. Metal Flashing: Type 304 Stainless Steel, 0.016 inch thick.
1. Fabricate in complete sections wherever possible. Where joints are unavoidable, provide splice plates of smooth, formed metal flashing.
 2. Fabricate end dams in manufacturing or shop environments. Fully weld and grind all welds smooth.
 3. Extend outer bottom edge 1/2 inch out from wall face, with outer edge bent down 30 degrees.
- F. Embedded Flashing:
1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 40 mil (1.0 mm) thick.
- G. Metal Drip Edge Flashing: Drip edge at bottom of embedded flashing. Fabricate from Type 304 stainless steel. Extend 3 inches into brick bed joint and 1/2 inch out from wall face, with outer edge bent down 30 degrees.
- H. Termination Bar for Embedded Flashing, Flanged: Stainless Steel, 1-1/2 inches tall with 3/8 inch flange at top and bottom. Sealant to be used to seal the top flange to the attached substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Installing contractor shall check cast stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.2 SETTING TOLERANCES

- A. Comply with Cast Stone Institute Technical Manual.
- B. Set stones 1/8 inch (3 mm) or less, within the plane of adjacent units.
- C. Joints, plus - 1/6 inch (1.5 mm), minus - 1/8 inch (3 mm).

3.3 INSTALLATION - ANCHORAGE

- A. Veneer to Framed Walls:
1. Install adjustable veneer anchors.
 - a. Fasten anchor to stud through sheathing with self-drilling and tapping screw, one at both ends of loop type anchor. Drill to the depth recommended by the manufacturer in respect to insulation depth.
 - b. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

B. Veneer to Concrete Masonry Unit Walls:

1. Install adjustable veneer anchors.
 - a. Pre-drill a 5/32 inch diameter hole into the CMU for every anchor. Pre-drill to the depth recommended by the manufacturer in respect to insulation depth.
 - b. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

3.4 INSTALLATION - JOINTING

A. Joint size:

1. At stone/brick joints 3/8 inch (9.5 cm).
2. At stone/stone joints in vertical position 1/4 inch (6 mm) (3/8 inch (9.5 mm) optional).
3. Stone/stone joint exposed on top 3/8 inch (.5 mm).

B. Joint Materials:

1. Mortar, Type N, ASTM C 270.
2. Use a full bed of mortar at all bed joints.
3. Flush vertical joints full with mortar.
4. Leave all joints with exposed tops or under relieving angles open for sealant.
5. Leave head joints in coping and projecting components open for sealant.

C. Location of joints:

1. As shown on architectural and shop drawings.
2. At control and expansion joints unless otherwise shown.
3. Prime ends of all units.
4. Fill opening in exposed face of expansion control joints with sealant and closed-cell backer rod as specified in Section 07 92 00, JOINT SEALANTS

3.5 INSTALLATION - FLASHING

A. Metal Flashing:

1. Install metal flashing at all window sill conditions that involve cast stone masonry.
 - a. Provide end dams at each side of each window sill condition.
 - b. Seal all required penetrations of the metal flashing, whether fasteners or cast stone reinforcement, with the appropriate sealant in SECTION 07 92 00 JOINT SEALANTS.

B. Embedded Flashing:

1. Install embedded flashing at base of all exterior cast stone veneer walls. Flashing shall be continuous at one brick course above First Floor elevation of +100'-0".
 - a. Install embedded flashing at exterior masonry veneer over bond beams and other water stops in wall. Flashing shall be continuous immediately at the top of opening or bottom of obstruction.
 - b. Install embedded flashing over metal drip edge flashing.
 - c. Install termination bar at the top of the embedded flashing. Termination bars shall be continuous. Install bars at 6 inches, minimum, above the topmost edge of the continuous cavity drain material.
 - d. Install cavity drain material on top of the embedded flashing surface, friction fit into the wall air space.

C. Weep Vents:

- a. Install weep vents at 600 mm (24 inches) on center, minimum in vertical joints of exterior masonry veneer or cavity wall facing over bond beams and other water stops in wall.
- b. Install weep vents at 600 mm (24 inches) on center, minimum, in vertical joints of exterior masonry veneer or cavity wall facing immediately at embedded flashing.
- c. Install weep vents at 600 mm (24 inches) on center, minimum, in vertical joints of exterior masonry veneer or cavity wall facing in the third row down from the uppermost brick coursing. The elevation of these high weep vents will vary according to the respective wall height.
- d. All weep vents to be friction fit.

D. Cavity Walls:

- a. Veneer Framed and CMU Walls:
 - 1) Build with 100 mm (4 inches) of cast stone over back up wall with insulation and air space.
 - 2) Keep air space clean of mortar accumulations and debris.

3.6 SETTING

- A. Drench units with clean water prior to setting.
- B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- C. Set units in full bed of mortar, unless otherwise detailed.

- D. Rake mortar joints 3/4 inch (18 mm) for pointing.
- E. Remove excess mortar from unit faces immediately after setting.
- F. Tuck point unit joints to a slight concave profile.

3.7 REPAIR AND CLEANING

- A. Repair chips with touchup materials furnished by manufacturer.
- B. Saturate units to be cleaned prior to applying an approved masonry cleaner.
- C. Consult with manufacturer for appropriate cleaners.

3.8 INSPECTION AND ACCEPTANCE

- A. Inspect finished installation according to Bulletin #36 published by the Cast Stone Institute.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel shapes, plates, and bars.
2. Bolts, nuts, and washers.

1.2 RELATED REQUIREMENTS

- A. Steel Decking: Section 05 31 00, STEEL DECKING.
- B. Steel Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Institute of Steel Construction (AISC):
 1. AISC Manual - Steel Construction Manual, 14th Ed.
 2. 303-10 - Code of Structural Steel Buildings and Bridges.
 3. 360-10: Specification for Structural Steel Buildings.
- C. The American Society of Mechanical Engineers (ASME):
 1. B18.22.1-09 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers.
- D. American Welding Society (AWS):
 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
- E. ASTM International (ASTM):
 1. A6/A6M-14 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 2. A36/A36M-14 - Carbon Structural Steel.
 3. A53/A53M-12 - Pipe, Steel, Black and Hot-Dip, Zinc-Coated, Welded and Seamless.
 4. A123/A123M-15 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 5. A242/A242M-13 - High-Strength Low-Alloy Structural Steel.
 6. A283/A283M-13 - Low and Intermediate Tensile Strength Carbon Steel Plates.
 7. A307-14 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 8. A325-14 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

9. A490-14a - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
10. A500/A500M-13 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
11. A501/A501M-14 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing and Rounds and Shapes.
12. A572/A572M-15 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. A992/A992M-15 - Structural Shapes.
14. F2329/F2329M-15 - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy steel Bolts, Screws, washers, Nuts, and Special Threaded Fasteners.

F. Master Painters Institute (MPI):

1. No. 18 - Primer, Zinc Rich, Organic.

G. Military Specifications (Mil. Spec.):

1. MIL-P-21035 - Paint, High Zinc Dust Content, Galvanizing, Repair.

H. Occupational Safety and Health Administration (OSHA):

1. 29 CFR 1926.752(e) - Guidelines For Establishing The Components Of A Site-Specific Erection Plan.
2. 29 CFR 1926-2001 - Safety Standards for Steel Erection.

I. Research Council on Structural Connections (RCSC) of The Engineering Foundation:

1. Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1.4 SUBMITTALS

A. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

B. Test Reports: Certify products comply with specifications.

1. Welders' qualifying tests.

C. Certificates: Certify each product complies with specifications.

1. Structural steel.
2. Steel connections.
3. Welding materials.
4. Shop coat primer paint.

D. Qualifications: Substantiate qualifications comply with specifications.

1. Fabricator.
2. Installer.
3. Welders and welding procedures.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: AISC Quality Certification participant designated as AISC Certified Plant, Category STD.
 - 1. Regularly fabricates specified products.
 - 2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.
- B. Installer Qualifications: AISC Quality Certification Program participant designated as AISC-Certified Erector, Category ACSE.
 - 1. Regularly installs specified products.
 - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
- C. Before commencement of Work, ensure steel erector provides written notification required by OSHA 29 CFR 1926.752(e). Submit a copy of the notification to Contracting Officer's Representative.
- D. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. W-Shapes:
 - 1. ASTM A992/A992M.
- B. M or S -Shapes:
 - 1. ASTM A36/A36M.
- C. Channel and Angles:
 - 1. ASTM A36/A36M.
- D. Plates and Bars:
 - 1. ASTM A36/A36M.
- E. Hollow Structural Sections:
 - 1. ASTM A500/A500M.
- F. Structural Pipe: ASTM A53/A53M, Grade B.
- G. Bolts, Nuts and Washers.
 - 1. High-strength bolts, including nuts and washers: ASTM A325.
 - 2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
 - 3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ASME B18.22.1.
- H. Welding Materials: AWS D1.1, type to suit application.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

2.3 FABRICATION

- A. Fabricate structural steel according to Chapter M, AISC 360.
- B. Shop and Field Connections:
1. Weld connections according to AWS D1.1/D1.1M. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
 2. High-Strength Bolts: High-strength bolts tightened to a bolt tension minimum 70 percent of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

2.4 FINISHES

- A. Shop Priming:
1. Prime paint structural steel according to AISC 303, Section 6.
 - a. Interstitial Space Structural Steel: Prime paint, unless indicated to receive sprayed on fireproofing.
- B. Shop Finish Painting: Apply primer and finish paint as specified in Section 09 91 00, PAINTING.
- C. Do not paint:
1. Surfaces within 50 mm (2 inches) of field welded joints.
 2. Surfaces indicated to be encased in concrete.
 3. Surfaces receiving sprayed on fireproofing.
 4. Beam top flanges receiving shear connector studs applied.
- D. Structural Steel Galvanizing: ASTM A123/A123M, hot dipped, after fabrication. Touch-up after erection: Clean and wire brush any abraded and other spots worn through zinc coating, including threaded portions of bolts and welds and touch-up with galvanizing repair paint.
1. Galvanize structural steel framing installed at exterior locations.
- E. Bolts, Nuts, and Washers Galvanizing: ASTM F2329, hot-dipped.

2.5 ACCESSORIES

- A. General: Shop paint steel according to AISC 303, Section 6.

- B. Finish Paint System: Primer and finish as specified in Section 09 91 00, PAINTING.
- C. Galvanizing Repair Paint: MPI No. 18.

PART 3 - EXECUTION

3.1 ERECTION

- A. Erect structural steel according to AISC 303 and AISC 360.
- B. Set structural steel accurately at locations and elevations indicated on drawings.
- C. Maintain erection tolerances of structural steel within AISC 303 requirements.
 - 1. Pour Stop Elevation Tolerance: 6 mm (1/4 inch), maximum, before concrete placement.
- D. Weld and bolt connections as specified for shop connections.

3.2 FIELD PAINTING

- A. After welding, clean and prime weld areas to match adjacent finish.
- B. Touch-up primer damaged by construction operations.
- C. Apply galvanizing repair paint to galvanized coatings damaged by construction operations.
- D. Finish Painting: As specified in Section 09 91 00, PAINTING.

3.3 FIELD QUALITY CONTROL

- A. Record Survey:
 - 1. Engage registered land surveyor or registered civil engineer to perform survey.
 - 2. Measure and record structural steel framing plumbness, level, and alignment after completing bolting and welding and before installation of work supported by structural steel.
 - 3. Identify deviations from allowable tolerances specified in AISC Manual.

- - E N D - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 05 12 13

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Section.

1.2 SUMMARY

- A. This Section includes requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel. (AESS). Refer to division 5 section 'Structural Steel' for all other requirements regarding steel work not included in this section. Requirements of Section 05 12 23 also apply to material covered under this section.

This section applies to any members in the areas defined as AESS below.

- 1. The following structural steel elements and connections are to be supplied and erected per AESS 3: The carport and vestibule exposed tube steel framing and connections.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1
 - a. Section 01 22 00 "Submittal Procedures" for Fabrication Documents, Product Data, and Samples
 - b. Section 01 43 00 "Quality Assurance" for fabricator and installer qualifications independent testing agency procedures and administrative requirements.
 - c. Section 01 45 00 "Quality Control" for Source and Field quality control requirements.
 - 2. Division 5 Sections 05 30 00 "Metal Decking" for erection requirements relating to exposed steel decking and its connections.

1.3 DEFINITIONS

- A. Architecturally Exposed Structural Steel: Structural Steel conforming to one of the categories of Architecturally Exposed Structural Steel or AESS Refer to ANSI/AISC 303-16 "Code of Standard Practice for Steel Buildings and Bridges".

- B. AESS 3: Structural Steel designated as "AESS 3 in the contract documents and conforming to ANSI/AISC 303-16, Chapter 10 definition of AESS3. These are feature elements viewed at a distance less than 20 feet. The art of metalworking is intended to be visible to the viewer.

1.4 ACTION SUBMITTALS

- A. General: Submit each item below according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified. Submit "Special Coatings" under Division 9.
- C. Fabrication Documents: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify all the requirements listed in sections 2.3 "Fabrication" and 3.3 "Erection" of this specification for each part. Provide connections for exposed AESS consistent with concepts shown on the architectural or structural drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein.
 - 4. Indicate orientation of HSS seams and mill marks (where applicable).
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. [Indicate which direction bolt heads should be oriented.]
 - 6. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 7. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.
 - 8. Indicate vent or drainage holes for HSS members.

- D. Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating the following specific AESS characteristics.
1. Continuous weld appearance
 2. Sharp edges ground smooth
 3. Surface preparation
 4. Fabrication mark removal
 5. Weld show through.
 6. Mill marks removed
 7. Butt and plug welds ground smooth and filled
 8. HSS weld seam oriented for reduced visibility
 9. Cross-sectional abutting surface aligned

1.5 INFORMATIONAL SUBMITTALS

- A. General: Submit each item below according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Qualification data for firms and persons specified in the 'Quality Assurance' Submittal to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, and other information specified. For each project, submit photographs showing detail of installed AESS.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.
- B. Erector Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- C. Comply with applicable provisions of the following specifications and documents:
1. ANSI/AISC 303-16," Code of Standard Practice for Steel Buildings and Bridges", Section 10.

- D. Pre-installation Conference: The General Contractor shall schedule and conduct conference at the project site to comply with requirements of Division 1 Section "Project Meetings." As a minimum, the meeting shall include the General Contractor, Fabricator, Erector, the finish-painting subcontractor, and the Architect. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch up painting, architect's observations, and other requirements for AESS.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver AESS to Project site in such quantities and at such times to ensure continuity of installation. All tie downs on loads shall be nylon straps or shall use softeners when using chains or wire rope slings to avoid damage to edges and surfaces of members. The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.
- C. Handle finish pieces using nylon type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged. Conform to ANSI/AISC 303-16 Sections 10.4, 10.5, and 10.6.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Fabrication Documents. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.9 COORDINATION

- A. Coordinate installation of anchors for AESS members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation. Anchorage concepts shall be as indicated on drawings and approved on final Fabrication Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Meet requirements Division 5 Section 'Structural Steel 05 12 23' as amended below.
- B. High-Strength Bolts, Nuts, and Washers: Per section 05 12 23 heavy hex heads and nuts Provide [rounded bolt heads with twist off bolts] [Heavy Hex bolt heads with standard bolts]. Provide [standard carbon steel] [Cadmium plated] [Mechanically galvanized] finish.

2.2 PAINT SYSTEM

- A. Compatibility: All components/procedures of the AESS paint system shall conform to the coating system specified, submitted, and approved per Division 9. As a minimum identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating and finish coating shall be from a single manufacturer combined in a system documented by the manufacturer with adequate guidance for the fabricator to procure and execute.
- B. Primer: As specified in 09 97 00 Special Coatings. Primer shall comply with all federal standards for VOC, lead and chromate levels
- C. Primer: Acrylic water-soluble shop coat with good resistance to normal atmospheric corrosion. Primer shall comply with all federal standards for VOC, lead and chromate levels.
- D. Finish Coating: Field apply intermediate and top coats per section 09 97 00.

2.3 FABRICATION AESS 3

- A. Fabricate to Requirements of 2.4 and as follows
- B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved samples.
- C. Grind projections at butt and plug welds to be smooth with the adjacent surface.
- D. Orientation of HSS seams shall be as shown.
- E. Copes, miters, and cuts in surfaces exposed to view shall have a maximum gap of 1/8" in an open joint. If the gap is shown to be in contact, the contact shall be uniform within 1/16".
- F. Mill marks shall not be exposed to view. If it is not possible to hide mill marks, then the mill marks are to be removed by appropriate length cutting of mill material. If this is not possible, the fabricator shall remove the mill mark, grind, and fill the surface to be consistent with the approved samples.

- G. The matching of abutting cross sections is required.

2.4 SHOP PRIMING

- A. Provide surface preparations to SSPC-SP6. Coordinate the required surface profile with the approved paint submittal prior to beginning surface preparation. Prior to blasting remove any grease and oil using solvent cleaning to meet SSPC-SP 1. Weld spatter, slivers and similar surface discontinuities shall be removed. Sharp corners resulting from shearing, flame cutting or grinding shall be eased.
- B. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections,
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.10 FABRICATION QUALITY CONTROL AND QUALITY ASSURANCE AESS 1 AND 2

- A. Structural requirements:
 - 1. Conform to Quality Control requirements per ANSI/AISC 360-16 "Specification for Structural Steel Buildings" Chapter N and ANSI/AISC 303-16," Code of Standard Practice for Steel Buildings and Bridges", Section 10. Refer to Section 05 12 00 "Structural Steel" for additional requirements.
 - 2. Owner will engage a Quality Assurance agency per the requirements of ANSI/AISC 360-16 "Specification for Structural Steel Buildings" Chapter N and ANSI/AISC 303-16," Code of Standard Practice for Steel Buildings and Bridges", Section 10
- B. AESS acceptance: The Architect shall observe the AESS steel in the shop at a viewing distance consistent with the final installation and determine acceptability based on the qualification data and submittals. The Quality Assurance agency shall have no responsibility for enforcing the requirements of this section.

2.11 FABRICATION QUALITY CONTROL AND QUALITY ASSURANCE AESS 3

- A. Conform to 2.10 and as follows.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The erector shall check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on the approved Fabrication Documents. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain the appearance of the AESS through the process of erection.

3.3 ERECTION AESS 1

- A. Employ special care to handle and erect AESS. Erect finish pieces using nylon straps or chains with softeners such that they are not damaged.
- B. Place weld tabs for temporary bracing and safety cabling at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.
- C. AESS Erection tolerances: Erection tolerances shall meet the requirements of standard frame tolerances for structural steel per Chapter 7 of ANSI/AISC 303-16.
- D. Set AESS accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- E. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
- F. Remove all backing and run out tabs.
- G. When temporary braces or fixtures are required to facilitate erection, care shall be taken to avoid any blemishes, holes or unsightly surfaces resulting from the use or removal of such temporary elements.

- H. Bolted Connections: Align bolt heads on the same side of the connection as indicated on the approved fabrication or erection documents.
- I. Weld Connections: Comply with AWS D1.1 and Section 05 12 00. Appearance and quality of welds shall be consistent. Employ methods that will maintain alignment of members without warp exceeding the tolerance of this section.
- J. Remove all weld spatter exposed to view.
- K. Grind off projections larger than 1/16" at field butt and plug welds.
- L. Continuous Welds: Where continuous welding is noted on the drawings, provide continuous welds of a uniform size and profile.
- M. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
- N. Splice members only where indicated.
- O. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the sample.

3.4 ERECTION AESS 2

- A. Erect to the requirements of 3.3 and as follows.
- B. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of ANSI/AISC 303-16.

3.5 ERECTION AESS 3

- A. Erect to the requirements of 3.4 and as follows.
- B. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.
- C. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.

3.6 FIELD QUALITY CONTROL AESS 3

- A. Conform to 3.7 and as follows.
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the approved mock up. The Quality Assurance Agency shall have no responsibility for enforcing the requirements of this section.

3.7 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer's instructions and as specified in Division 9, Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded area. Any repairs to galvanized surfaces shall comply with ASTM A780/A780M - 2015 Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.

- - - END - - -

Version 2.0 09/27/2017

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 05 31 00
STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corrugated metal form deck supporting concrete fill.
2. Single pan fluted metal roof deck as roof substrate.

1.2 RELATED REQUIREMENTS

- A. Structural Steel Shapes: Section 05 21 00, STRUCTURAL STEEL FRAMING.
- B. Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Finish Painting: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. AISI - American Iron and Steel Institute.
 1. S100-12 - Specification for the Design of Cold-formed Steel Structural Members.
- C. American Welding Society (AWS):
 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
 2. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.
- D. ASTM International (ASTM):
 1. A36/A36M-14 - Carbon Structural Steel.
 2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
 4. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 5. E119-15 - Fire Tests of Building Construction and Materials.
- E. FM Global (FM):
 1. 1-28-15 - Wind Design.
 2. Factory Mutual Research Approval Guide.
- F. Master Painters Institute (MPI):
 1. No. 18 - Primer, Zinc Rich, Organic.
- G. Military Specifications (Mil. Spec.):
 1. MIL-P-21035B - Paint, High Zinc Dust Content, Galvanizing Repair.

H. Steel Deck Institute (SDI):

1. No. 31-07 - Design Manual for Composite Deck, Form Decks, and Roof Decks.

I. UL LLC (UL):

1. Listed - Online Certifications Directory.
2. 580-13 - Tests for Uplift Resistance of Roof Assemblies.

1.4 SUBMITTALS

A. Submittal Drawings:

1. Show layout, connections to supporting members, anchorage, sump pans, accessories, deck openings and reinforcements.
2. Show similar information necessary for completing installation as shown and specified, including supplementary framing, ridge, and valley plates, cant strips, cut openings, special jointing or other accessories.
3. Show welding, side lap, closure, deck reinforcing and closure reinforcing details.
4. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Show steel decking section properties and structural characteristics.

C. Qualifications: Substantiate qualifications comply with specifications.

1. Welders and welding procedures.

1.5 QUALITY ASSURANCE

- A. Welders and Welding Procedures Qualifications: AWS D1.3/D1.3M.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design steel decking and accessories according to AISI S100.

2.2 MATERIALS

- A. Galvanized Steel Sheet: ASTM A653/A653M; G60 coating.

B. Primer for Shop Painted Sheets: Manufacturer's standard primer (2 coats). When finish painting of steel decking is specified in Section 09 91 00, PAINTING primer coating shall be compatible with specified finish painting.

C. Steel Shapes: ASTM A36/A36M.

2.3 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 METAL ROOF DECK

A. Metal Roof Deck: Steel decking of the type, depth, thickness, and section properties as shown.

B. Metal Form Deck: Corrugated deck units as permanent form for reinforced concrete slabs.

1. Depth and Thickness: As indicated on drawings.

2. Material: Galvanized sheet steel.

C. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces as permanent support for superimposed loads.

1. Deck Style:

a. Wide Rib (Type B) deck.

b. Intermediate Rib (Type F) deck.

c. Narrow Rib (Type A) deck.

d. Deep Rib (Type N) deck.

2. Depth and Thickness: As indicated on drawings.

3. Material: Galvanized sheet steel.

D. Long-Span Exposed Deck:

1. Basis-Of-Design: TORIS by EPIC Metals

a. TORIS 4CA, as specified in the Metal Decking Schedule on Sheet S-000.

1) Supply acoustical elements within all flutes not occupied by utilities / conduits.

2) Provide Natacoat finish.

3) Provide Access Panels and Hidden Utility Features for sprinkler pipe, electrical conduit, and all other piping related to the ceiling design.

b. TORIS 5.5, as specified in the Metal Decking Schedule on Sheet S-000.

1) Provide Natacoat finish.

- 2) Provide Access Panels and Hidden Utility Features for sprinkler pipe, electrical conduit, and all other piping related to the ceiling design.
- E. Do not use steel deck for hanging supports of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.
- F. Include integral system for steel decking units used for interstitial levels.
1. Provide system suitable for simple point of attachment for light duty hanger devices.
 2. Provide system suitable to allow for flexibility for attaching hangers for support of suspended ceilings, electrical, plumbing, heating, or air conditioning items, weight not to exceed 50 kg/m² (10 psf).
 3. Provide a minimum spacing pattern of 300 mm (12 inches) on centers longitudinally and 600 mm (24 inches) on centers transversely.
 4. Maximum allowable load suspended from any hanger: 23 kg (50 pounds).
 5. System consisting of fold-down type hanger tabs or lip hanger is acceptable.

2.5 FABRICATION

- A. Fabricate steel decking in sufficient lengths to extend over 3 or more supports, except for interstitial levels.
1. Cut metal deck units to proper length in shop.
- B. Fabricate accessories required to complete installation of steel decking.
1. Exposed to View: Fabricate from sheet steel matching metal decking.
 2. Concealed from View: Fabricate from galvanized sheet steel.
- C. Sheet Metal Accessories:
1. Metal Cover Plates: For end-abutting decking, to close gaps at changes in deck direction, columns, walls, and openings.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.
 3. Metal Closure Strips: For openings between decking and other construction. Form to configurations required to provide tight-fitting closures at open ends of flutes and sides of decking.
 - a. Sheet Steel: Minimum 1.0 mm (0.04 inch) thick.

4. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the drawings. Fabricate cant strips with minimum 125 mm (5 inch) face width.

- a. Sheet Steel: Minimum 0.8 mm (0.03 inch) thick.

2.6 FINISHES

- A. Shop prime painted sheet steel with two coats of primer.

2.7 ACCESSORIES

- A. Primer: Manufacturer's standard primer compatible with finish painting specified in Section 09 91 00, PAINTING.
- B. Welding Materials: AWS D1.1, type to suit application.
- C. Galvanizing Repair Paint: MPI No. 18.
- D. Touch-Up Paint: Match shop finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove contaminants from structural steel surfaces where steel decking will be welded.

3.2 ERECTION

- A. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace deck units that become damaged after erection and before casting concrete at no cost additional to the Government.
- B. Place steel decking at right angles to supporting members with ends located over supports.
- C. Lap end joints 50 mm (2 inches), minimum.
- D. Corrugated Form Deck Fastening:
 1. Weld end laps of corrugated form deck units in valley of side lap and at middle of sheet.
 - a. Weld Spacing: Maximum 380 mm (15 inches) on center.
 2. Weld corrugated deck to intermediate supports in X-pattern. Weld in valley of side laps on every other support and in valley of center corrugation on remaining support.
 - a. Weld Spacing: Maximum 760 mm (30 inches) on center.

E. Roof Deck Fastening:

1. Fasten decking to steel supporting members by welding.
 - a. Welds: 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength.
 - b. Weld Spacing: Maximum 300 mm (12 inches) on center at every support. Use closer spacing where required for lateral force resistance by diaphragm action.
2. Fasten split or partial decking panels to structure in every valley.
3. Fasten decking to each supporting member at ribs where side laps occur.
 - a. Power driven fasteners is acceptable in lieu of welding if strength equivalent to welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
4. Mechanically fasten decking side laps with self-tapping No. 8 or larger machine screws.
 - a. Fastener Locations: Mid-span and maximum 900 mm (3 feet) on center.

F. Cutting and Fitting:

1. Field cut steel decking to accommodate columns and other penetrating items.
2. Cut openings located and dimensioned on Structural Drawings.
3. Coordinate openings for other penetrations shown on approved submittal drawings but not shown on Structural Drawings.
 - a. Cut and reinforce required opening.
4. Make cuts neat and trim using metal saw, drill, or punch-out device. Cutting with torches is prohibited.
5. Do not make cuts in the metal deck that are not shown on the approved metal decking submittal drawings.
 - a. When additional openings are required, submit scaled drawing, locating required opening and other openings and supports in immediate area.
 - b. Do not cut the opening until drawing is approved by Contracting Officer's Representative.
 - c. Provide additional reinforcing and framing required for opening.

- d. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected steel decking.
- 6. Opening Reinforcement: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.
- G. Touch up damaged factory finishes.
 - 1. Apply galvanizing repair paint to damaged galvanized surfaces.
 - 2. Apply touch up paint to damaged shop painted surfaces.

- - E N D - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior load-bearing steel stud walls.
2. Interior load-bearing steel stud walls.
3. Exterior non-load-bearing steel stud curtain wall.
4. Steel joists.
5. Steel trusses.

1.2 RELATED WORK:

- A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- C. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

- A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.
- B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the minimum physical and structural properties indicated.
- C. Structural Performance: Engineer, fabricate, and erect cold-formed metal roof trusses to withstand design loads within limits and under conditions required.
 1. Design Loads: As indicated on plan and outlined in the blast report file B09153 by Associated Research Associates, Inc. Blast report is attached in the appendices.
 2. Design roof truss system to withstand design loads without deflections greater than the following:
 - a. Roof Trusses: Vertical deflection of 1/240 of the span.
 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).
 4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

5. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal roof trusses by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS:

- A. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.
- B. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.
- C. For cold-formed metal roof trusses indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.

1.5 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Iron and Steel Institute (AISI):
Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)
- C. American Society of Testing and Materials (ASTM):
A36/A36M-08.....Standard Specifications for Carbon Structural Steel
A123/A123M-09.....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M-09.....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A307-10.....Standard Specifications for Carbon Steel Bolts and Studs
A653/A653M-10.....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
C955.....Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
C1107/C1107M-08.....Standard Specifications for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

E488-96(R2003).....Standard Test Methods for Strength of Anchors
in Concrete and Masonry Elements

E1190-95(R2007).....Standard Test Methods for Strength of Power-
Actuated Fasteners Installed in Structural
Members

D. American Welding Society (AWS):

D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing
Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel for joists, studs and accessories 16 gage and heavier: ASTM
A653, structural steel, zinc coated G90, with a yield of 340 MPa (50
ksi) minimum.

B. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM
A653, structural steel, zinc coated G90, with a yield of 230 MPa (33
ksi) minimum.

C. Galvanizing Repair Paint: MIL-P-21035B.

D. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive,
nonstaining grout containing selected silica sands, Portland cement,
shrinkage-compensating agents, plasticizing and water-reducing agents,
complying with ASTM C1107, with fluid consistency and a 30 minute
working time.

2.2 WALL FRAMING:

A. Steel Studs: Complying with ASTM C 955. Manufacturer's standard C-
shaped steel studs of web depth indicated, with lipped flanges, and
complying with the following:

1. Minimum Base-Steel Thickness (uncoated):

As indicated.

2. Flange Width:

As indicated.

3. Web: Punched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched,
of web depths indicated, with straight flanges, and complying with the
following:

1. Design Uncoated-Steel Thickness: Matching steel studs.

2. Flange Width: Manufacturer's standard deep flange where indicated, standard flange elsewhere.

2.3 JOIST FRAMING:

- A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the following:
 1. Minimum Base-Steel Thickness: As indicated.
Design Thickness: As indicated.
 2. Flange Width: As indicated.
- B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, unpunched, of web depths indicated, with straight flanges, and complying with the following:
 1. Design Thickness: Matching steel joists.
 2. Flange Width: As indicated.

2.4 FRAMING ACCESSORIES:

- A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Gusset plates.
 5. Deflection track and vertical slide clips.
 6. Stud kickers and girts.
 7. Joist hangers and end closures.
 8. Reinforcement plates.

2.5 ANCHORS, CLIPS, AND FASTENERS:

- A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.
- B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 REQUIREMENTS:

- A. Welding in accordance with AWS D1.3
- B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

- A. Framing components may be preassembled into panels. Panels shall be square with components attached.
- B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.
- C. Hold members in place until fastened.
- D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

- A. Handle and lift prefabricated panels in a manner as to not distort any member.
- B. Securely anchor tracks to supports as shown.
- C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.
- D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

- E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.
- F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.
- G. Install headers in all openings that are larger than the stud spacing in that wall.
- H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.
- I. Studs in one piece for their entire length, splices will not be permitted.
- J. Provide a load distribution member at top track where joist is not located directly over bearing stud.
- K. Provide joist bridging and web stiffeners at reaction points where shown.
- L. Provide end blocking where joist ends are not restrained from rotation.
- M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one-half joist span and when floor and roof openings interrupt one or more spanning members.
- N. Provide temporary bracing and leave in place until framing is permanently stabilized.
- O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.
- P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

3.3 TOLERANCES:

- A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.
- C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
- D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

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. Shelf Angles
 - 4. Railings and Guard Rails

1.2 RELATED WORK

- A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.
- B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Prime and finish painting: Section 09 91 00, PAINTING.

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. 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
 - 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.
- C. Guard railings and Handrails: 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.
- D. Floor Plate:
 - 1. Steel ASTM A786.
 - 2. Aluminum: ASTM B632.
- E. Steel Pipe (Bollard): ASTM A53.
 - 1. Galvanized for exterior locations.
 - 2. Type S, Grade A unless specified otherwise.
 - 3. NPS (inside diameter) as shown.
- F. Cast-Iron: ASTM A48, Class 30, commercial pattern.
- G. Malleable Iron Castings: A47.
- H. Primer Paint: As specified in Section 09 91 00, PAINTING.
- I. Stainless Steel Tubing: ASTM A269, type 302 or 304.
- J. 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.
- K. Grout: ASTM C1107, pourable type.
- L. Insect Screening: ASTM D3656.

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.
- 3. Steel and Iron: NAAMM AMP 504.
 - a. Surfaces exposed in the finished work:
 - 1) Finish smooth rough surfaces and remove projections.
 - 2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
 - b. Shop Prime Painting:
 - 1) Surfaces of Ferrous metal:
 - a) Items not specified to have other coatings.
 - b) Galvanized surfaces specified to have prime paint.
 - c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
 - d) Clean of oil, grease, soil, and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
 - e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
 - 2) Non ferrous metals: Comply with MAAMM-500 series.

G. Protection:

- 1. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:

- 1. Fabricate ASTM A36 structural steel shapes as shown.
- 2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
- 3. Field connections may be welded or bolted.

B. For Wall Mounted Items:

1. For items supported by metal stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and 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.

C. For Trapeze Bars:

1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.
2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
3. Fabricate concealed components of structural steel shapes unless shown otherwise.
4. Stainless steel ceiling plate drilled for eye bolt.
5. Continuously weld connections where welds shown.
6. Use modular channel where shown with manufacturers bolts and fittings.
 - a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
 - b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

D. For Intravenous Track and Cubical Curtain Track:

1. Fabricate assembly of steel angle as shown.
2. Drill angle bent ends for anchor screws to acoustical suspension system and angle for hanger wires.
3. Provide pipe sleeve welded to angle.

2.6 LOOSE LINTELS

- A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.

- B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.
- C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
 - 1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
 - 2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- E. Provide bearing plates for lintels where shown.
- F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.
- G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.
- H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

2.7 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.

2.8 RAILINGS

- A. In addition to the dead load design railing assembly to support live load specified.
- B. Fabrication General:
 - 1. Provide continuous welded joints, dressed smooth and flush.
 - 2. Standard flush fittings, designed to be welded, may be used.
 - 3. Exposed threads will not be approved.
 - 4. Form handrail brackets to size and design shown.
 - 5. 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. Handrails:
- 1. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
 - 2. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.
- D. Steel Pipe Railings:
- 1. Fabricate of steel pipe with welded joints.
 - 2. Number and space of rails as shown.
 - 3. Space posts for railings not over 1800 mm (6 feet) on centers between end posts.
 - 4. Form handrail brackets from malleable iron.
 - 5. Fabricate removable sections with posts at end of section.
 - 6. 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 jambs.
 - c. Fabricate rails for floor openings for anchorage in sleeves.
 - d. Provide guard railings not less than 1067 mm (42-inches) high.
 - e. Provide guard railing framing to not allow passage of a 4-inch sphere at any location above the stair noses to top of guard rails.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Items set into concrete or masonry.
 - 1. Provide temporary bracing for such items until concrete or masonry is set.
 - 2. Place in accordance with setting drawings and instructions.
 - 3. Build strap anchors, into masonry as work progresses.

- C. Field weld in accordance with AWS.
 - 1. Design and finish as specified for shop welding.
 - 2. Use continuous weld unless specified otherwise.
- D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- E. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.
- F. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

- A. Anchorage to structure.
 - 1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
 - 2. Secure supports to concrete inserts by bolting or continuous welding as shown.
 - 3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
 - 4. Secure steel plate or hat channels to studs as detailed.
- B. Supports for Wall Mounted items:
 - 1. Locate center of support at anchorage point of supported item.
 - 2. Locate support at top and bottom of wall hung cabinets.
 - 3. Locate support at top of floor cabinets and shelving installed against walls.
 - 4. Locate supports where required for items shown.
- C. Supports for intravenous (IV) Track and Cubicle Curtain Track:
 - 1. Install assembly where shown after ceiling suspension grid is installed.
 - 2. Drill angle for bolt and weld nut to angle prior to installation of tile.
- D. Support for cantilever grab bars:
 - 1. Locate channels or tube in partition for support as shown, and extend full height from floor to underside of structural slab above.
 - 2. Anchor at top and bottom with angle clips bolted to channels or tube with two, 9 mm (3/8 inch) diameter bolts.

3. Anchor to floors and overhead construction with two 9 mm (3/8 inch) diameter bolts.
 4. Fasten clips to concrete with expansion bolts, and to steel with machine bolts or welds.
- E. Supports for Trapeze Bars:
1. Secure plates to overhead construction with fasteners as shown.
 2. Secure angle brace assembly to overhead construction with fasteners as shown and bolt plate to braces.
 3. Fit modular channel unit flush with finish ceiling, and secure to plate with modular channel unit manufacturer's standard fittings through steel shims or spreaders as shown.
 - a. Install closure plates in channel between eye bolts.
 - b. Install eyebolts in channel.

3.3 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.

3.4 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.

3.5 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.

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

3.6 STEEL COMPONENTS FOR MILLWORK ITEMS

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

3.8 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 manufacturer, and protected from damage until completion of the project.

- - - E N D - - -

SECTION 05 51 00

METAL STAIRS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel stairs with railings.
- B. Types:
 - 1. Closed riser stairs with concrete filled treads and platforms.

1.2 RELATED WORK

- A. Section 03 30 00, CAST-IN-PLACE CONCRETE: Concrete fill for treads and platforms.
- B. Section 05 50 00, METAL FABRICATIONS: Wall handrails and railings for other than steel stairs.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.
- C. Fabrication qualifications.
 - a. Installer qualifications.
 - b. Calculations.
- D. Welding qualifications.

1.4 QUALITY ASSURANCE

- A. Fabricator: A firm with a minimum of three (3) years' experience in type of work required by this section. Submit fabricator qualifications.
- B. Installer: A firm with a minimum of three (3) years' experience in type of work required by this section. Submit installer qualifications.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M and AWS D1.3/D1.3M.

1.5 APPLICATION PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation.
- B. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12.....Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

- B18.2.3.8M-81 (R2005).....Metric Heavy Lag Screws
- B18.6.1-81 (R2008).....Wood Screws (Inch Series)
- B18.6.3-13.....Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)
- B18.6.5M-10.....Metric Thread Forming and Thread Cutting Tapping Screws
- B18.6.7M-10.....Metric Machine Screws
- B18.22M-81 (R2010).....Metric Plain Washers
- B18.21.1-09.....Washers: Helical Spring-Lock, Tooth Lock, and Plain Washer (Inch Series)
- C. ASTM International (ASTM):
 - A36/A36M-19.....Structural Steel
 - A47/A47M-99e1R2018).....Ferritic Malleable Iron Castings
 - A48/A48M-03 (R2016).....Gray Iron Castings
 - A53/A53M-20.....Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless
 - A123/A123M-17.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - A153/A153M-16a.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - A307-14e1.....Carbon Steel Bolts, Studs and Threaded Rod 60,000 PSI Tensile Strength
 - A653/A653M-20.....Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated (Galvannealed) by the Hot-Dip Process
 - A786/A786M-15.....Rolled Steel Floor Plates
 - A1008/A1008M-20.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy
 - A1011/A1011M-18.....Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural, High-Strength, Low-Alloy
- D. American Welding Society (AWS):
 - D1.1/D1.1M-15.....Structural Welding Code-Steel
 - D1.3/D1.3M-18.....Structural Welding Code-Sheet Steel
- E. The National Association of Architectural Metal Manufactures (NAAMM) Manuals:
 - MBG 531-17.....Metal Bar Gratings
 - AMP521-01 (R2012).....Pipe Railing Manual, Including Round Tube

- F. American Iron and Steel Institute (AISI):
S100-12.....Design of Cold-Formed Steel Structural Members
- G. National Fire Protection Association (NFPA):
101-18.....Life Safety Code
- H. Society for Protective Coatings (SSPC):
Paint 25(1997; E 2004)..Zinc Oxide, Alkyd, Linseed Oil Primer for Use
Over Hand Cleaned Steel, Type I and Type II

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Pipe: ASTM A53/A53M, Standard Weight, zinc coated.
- B. Steel Grating: Metal bar type grating NAAMM BG.
- C. Sheet Steel: ASTM A1008/A1008M.
- D. Structural Steel: ASTM A36/A36M.
- E. Steel Floor Plate: ASTM A786/A786M.
- F. Steel Decking: Form from zinc coated steel conforming to
ASTM A653/A653M, with properties conforming to AISI S100 Specification
for the Design of Cold-Formed Steel Structural Members.
- G. Steel Plate: ASTM A1011/A1011M.
- H. Iron Castings: ASTM A48/A48M, Class 30.
- I. Malleable Iron Castings: ASTM A47/A47M.

2.2 FABRICATION GENERAL

- A. Fasteners:
 - 1. Conceal bolts and screws wherever possible.
 - 2. Use countersunk heads on exposed bolts and screws with ends of bolts
and screws dressed flush after nuts are set.
 - 3. Galvanized zinc-coated fasteners in accordance with ASTM A153/A153M
and used for exterior applications or where built into exterior
walls or floor systems. Select fasteners for the type, grade, and
class required for the installation of steel stair items.
 - 4. Standard/regular hexagon-head bolts and nuts be conforming to
ASTM A307, Grade A.
 - 5. Square-head lag bolts conforming to ASME B18.2.3.8M, ASME B18.2.1.
 - 6. Machine screws cadmium-plated steel conforming to ASME B18.6.7M,
ASME B18.6.3.
 - 7. Wood screws, flat-head carbon steel conforming to ASME B18.6.5M,
ASME B18.6.1.
 - 8. Plain washers, round, general-assembly-grade, carbon steel
conforming to ASME B18.22M, ASME B18.21.1.

9. Lockwashers helical spring, carbon steel conforming to ASME B18.2.1, ASME B18.2.3.8M.

B. Welding:

1. Structural steel, AWS D1.1/D1.1M, and sheet steel, AWS D1.3/D1.3M.
2. Where possible, locate welds on unexposed side.
3. Grind exposed welds smooth and true to contour of welded member.
4. Remove welding splatter.

C. Remove sharp edges and burrs.

D. Fit stringers to head channel and close ends with steel plates welded in place where shown.

E. Fit face stringer to newel post by tenoning into newel post, or by notching and fitting face stringer to side of newel where shown.

F. Shop Prime Painting: Shop prime steelwork with red oxide primer in accordance with SSPC Paint 25.

G. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 0.8 mm (1/32 inch), and bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

H. Continuously weld corners and seams in accordance with the recommendations of AWS D1.1/D1.1M. Grind smooth exposed welds and flush to match and blend with adjoining surfaces.

I. Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts.

J. Provide and coordinate anchorage of the type indicated with the supporting structure. Fabricate anchoring devices, space as indicated and required to provide adequate support for the intended use of the work.

K. Use hot-rolled steel bars for work fabricated for bar stock unless work is indicated or specified as fabricated from cold-finished or cold-rolled stock.

L. Soffit Clips: Provide clips with holes for attaching metal furring for gypsum wallboard soffits.

2.3 RAILINGS

A. Fabricate railings and guard rails, including handrails, from steel pipe.

1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
2. Wall handrails and guard rails are provided under Section 05 50 00, METAL FABRICATIONS.
 - B. Return ends of handrail to wall and close free end.
 - C. Provide standard terminal castings where fastened to newel.
 - D. Space intermediate posts not over 1828 mm (6 feet) on center between end post.
 - E. Fabricate handrail brackets from cast malleable iron.
 - F. Provide standard terminal fittings at ends of post and rails.

2.4 CLOSED RISER STAIRS

- A. Provide treads, risers, platforms, railings, stringers, headers, and other supporting members.
- B. Fabricate pans for treads and platforms, and risers from sheet steel.
- C. Fabricate stringers, headers, and other supporting members from structural steel.

PART 3 - EXECUTION

3.1 STAIR INSTALLATION

- A. Provide columns, hangers, and struts required to support the loads imposed.
- B. Perform job site welding and bolting as specified for shop fabrication.
- C. Set stairs and other members in position and secure to structure as shown.
- D. Install stairs plumb, level and true to line.
- E. Provide steel closure plate to fill gap between the stringer and surrounding wall. Weld and apply primer, ready to accept paint finish.

3.2 RAILING INSTALLATION

- A. Install standard terminal fittings at ends of posts and rails.
- B. Secure brackets, posts, and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.
- C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3658 mm (1/8-inch in 12 feet).
- D. Set posts plumb and aligned to within 3 mm in 3658 mm (1/8-inch in 12 feet).

3.3 FIELD PRIME PAINTING

- A. Touch-up abraded areas with same primer paint used for shop priming.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

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. Milled woodwork: Section 12 32 00, WOOD CASEWORK.
- B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.
- C. Cement board sheathing: Section 06 16 63, CEMENTITIOUS SHEATHING.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.
- E. Manufacturer's certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 152 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.5 QUALITY ASSURANCE:

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

1.6 GRADING AND MARKINGS:

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

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):
 - NDS-15.....National Design Specification for Wood Construction
 - WCD1-01.....Details for Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
 - A190.1-07.....Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12 (R2013).....Square and Hex Bolts and Screws
 - B18.2.2-10.....Square and Hex Nuts
 - B18.6.1-81 (R2008).....Wood Screws
- E. American Plywood Association (APA):
 - E30-11.....Engineered Wood Construction Guide
- F. ASTM International (ASTM):
 - A653/A653M-13.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

- C954-11.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness
- C1002-14.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
- D198-14.....Test Methods of Static Tests of Lumber in Structural Sizes
- D2344/D2344M-13.....Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- D2559-12a.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
- D3498-03 (R2011).....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
- D6108-13.....Test Method for Compressive Properties of Plastic Lumber and Shapes
- D6109-13.....Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products
- D6111-13a.....Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement
- D6112-13.....Test Methods for Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
- F844-07a (R2013).....Washers, Steel, 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):
A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)
- I. Forest Stewardship Council (FSC):
FSC-STD-01-001 (Ver. 4-0) FSC Principles and Criteria for Forest Stewardship

- J. Military Specification (Mil. Spec.):
MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated
- K. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products
- L. Truss Plate Institute (TPI):
TPI-85.....Metal Plate Connected Wood Trusses
- M. U.S. Department of Commerce Product Standard (PS)
PS 1-95.....Construction and Industrial Plywood
PS 20-10.....American Softwood Lumber Standard
- N. ICC Evaluation Service (ICC ES):
AC09.....Quality Control of Wood Shakes and Shingles
AC174.....Deck Board Span Ratings and Guardrail Systems
(Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

- A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
 - 1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards
 - 3. All composite wood sheathing shall be fire-retardant-treated CDX plywood.
- B. Lumber Other Than Structural:
 - 1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
 - 2. Framing lumber: Minimum extreme fiber stress in bending of 7584 kPa (1100 PSI).
 - 3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade. Douglas Fir shall be the only acceptable species.

C. Sizes:

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

D. Moisture Content:

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

E. Fire Retardant Treatment:

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

2.2 ROUGH HARDWARE AND ADHESIVES:

A. Anchor Bolts:

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

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

C. Washers

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

D. Screws:

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

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing 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.

2.3 CEMENTITIOUS SUBFLOOR PANELS:

- A. Basis of Design: Structural Panel Concrete Subfloor by USG
- B. Subfloor:
 - 1. Subfloor Panels:
 - a. Shall be selected from manufacturer's load tables to carry the project live load design over a maximum of 24 inches on center support spacing while limiting deflection to a maximum of L/360 as determined by the project architect.
 - b. Minimum 3/4 inch thick, 4'x8' (1220mm x 2440mm), with span rating for supports 24 inches on center unless specified otherwise.
 - 1. Provide 16 gauge cold-formed metal framing at all edges of subfloor panels that are less than 24 inches in any direction.
 - c. Mechanical properties:
 - 1. Density: minimum 75 lbs/ft³ per ASTM C1185
 - 2. Weight: 5.0 lbs/ft³ per ASTM D1037 at a thickness of 3/4 inch
 - 3. Long Edges: tongue and groove
 - d. Performance requirements:
 - 1. Surface burning characteristics: class A in accordance with ASTM E84 / UL 723 having achieved 0 flame spread and 0 smoke development indices.
 - 2. Must pass the modified ASTM E136 for a minimum duration of 10 minutes.

2.4 PLYWOOD:

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

C. Sheathing:

1. APA rated Exposure 1 or Exterior; panel grade CD or better.
2. Wall sheathing:
 - a. Minimum 9 mm (11/32 inch) thick with supports 406 mm (16 inches) on center and 12 mm (15/32 inch) thick with supports 610 mm (24 inches) on center unless specified otherwise.
 - b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.

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.
 2. Bolts:
 - a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.

- c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Provide toggle bolts to hollow masonry or sheet metal.
 - e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
- 3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
 - a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
 - 4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
 - 5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
 - 6. Screws to Join Wood:
 - a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
 - 7. Installation of Timber Connectors:
 - a. Conform to applicable requirements of the AFPA NDS.
 - b. Fit wood to connectors and drill holes for fasteners so wood is not split.
- C. Blocking Nailers, and Furring:
- 1. Install furring, blocking, nailers, and grounds where shown.
 - 2. Provide longest lengths practicable.
 - 3. 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.

3.2 INSTALLATION OF CEMENTITIOUS SUBFLOOR PANELS

- A. Framing:

1. Roof trusses, joist and/or other roof framing components must be designed to meet the strength and deflection criteria noted on structural drawings.
2. Provide 16 gauge cold-formed metal framing at all edges of subfloor panels that are less than 24 inches in any direction.
3. The attachment flange or bearing edge shall be a minimum 2" wide, or doubled up at panel board edges.
4. Metal framing shall be spaced a maximum of 24" on center
5. All blocking or bridging must be installed prior to the installation of panels.
6. Framing must be of good quality, free of bows, twists or other malformations.

B. Fasteners:

1. All fasteners to be approved through the Cementitious Subfloor Panel manufacturer, in respect to type of fastener, dimensions of fastener, and specific fastening patterns based upon the construction it is being installed.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 07 13 00
SHEET WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies sheet waterproofing materials used for shower pan waterproofing in personnel showers.

1.2 QUALITY CONTROL:

Approval by the Resident Engineer is required of products of proposed manufacturers.

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. Sheet waterproofing.
 - 2. Printed installation instructions.
- C. Certificates:
 - 1. Sheet waterproofing manufacturer's approval of adhesive used.
 - 2. Waterproofing tests report indicating that water test as specified has been made for each shower area and that each area was found to be watertight.
- D. Samples:
 - 1. Sheet waterproofing, 150 mm (6 inches) square.
 - 2. Waterproofed building paper, 150 mm² (6 inches square).
 - 3. Adhesive, 0.24 L (1/2 pint).

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to job in manufacturer's original unopened containers with brand name marked thereon.
- B. Unload and store so as to prevent injury to materials.
- C. Do not store material in areas where temperature is lower than 10°C (50°F), or where prolonged temperature is above 32°C (90°F).

1.5 WARRANTY

Shower pan waterproofing is subject to the terms of Article titled "Warranty of Construction", FAR clause 52.246-21, except that warranty period is extended to two years.

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced by basic designation only.
- B. Federal Specification (Fed. Spec.):
UU-B-790A INT AMD.....Building Paper, Vegetable Fiber: (Kraft, Waterproof, Water Repellent ad Fire Resistant)

PART 2 - PRODUCTS

2.1 SHOWER PAN WATERPROOFING SHEET:

- A. Rubber type sheet formed of non-reinforced, homogeneous, impermeable, sheeting compound reduced to thermoplastic state, resistant to fungus, mildew and bacteria, not less than 1.5 mm (60 mils) thick.
- B. Asphaltic sheet formed with a laminated asphalt construction consisting of eight plies of Kraft paper bonded and saturated by seven layers of asphalt, reinforced with three layers of glass fibers and faced with polyethylene sheet; total weight 1.9 kg/m² (0.40 pounds per square foot).

2.2 ADHESIVES:

- A. As furnished by the manufacturer of the sheet waterproofing.
- B. Compatible with adjacent materials where contact occurs.

2.3 WATERPROOFED BUILDING PAPER:

Fed. Spec. UU-B-790, Type I, Grade C.

2.4 CONCRETE PATCHING COMPOUND:

- A. Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors.
- B. Have not less than the following physical properties:
 - 1. Compressive strength - 25 mPa (3500 psi).
 - 2. Tensile strength - 7 mPa (1000 psi).
 - 3. Flexural strength - 7 mPa (1000 psi).
 - 4. Density - 1.9.
- C. Capable of being applied in layers up to 50 mm (two inches) thick, being brought to a feather edge, and being troweled to a smooth finish.
- D. Ready for use in 48 hours after application.

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Before installing shower pan waterproofing, adjoining surfaces shall be clean, smooth, firm and dry.
- B. Concrete surfaces shall be cured a minimum of seven days and be free from release agents, concrete curing agents, and other contaminants.

- C. Remove all high spots and loose and foreign particles and fill all voids, depressions joints and cracks with concrete patching compound.
- D. Ensure vertical surfaces have a continuous supportive back substrate for waterproofing.

3.2 INSTALLATION:

- A. Coat entire surfaces to receive shower pan waterproofing with adhesive spread at rate of 1 L/m² (one gallon per 40 square feet).
- B. Butt joints and cover with a strip of the waterproofing sheeting material eight inches in width and seal with adhesive.
- C. Carry sheeting up vertical surfaces not less than 4 inches above surface of shower floor. Carry over tops of curbs.
- D. Roll entire horizontal surfaces with 23 to 45 kg (50 to 100 pounds) roller and roll corners and vertical sections with a rubber roller to insure solid anchorage.
- E. Make cut out for floor drains and fit to drain for watertight assembly, coordinating with drain installation.

3.3 PROTECTION:

- A. When finish floor will not be immediately installed, protect waterproofing pan.
- B. Cover with 2 inches of sand or waterproofed building paper.
- C. Maintain protection until finished floor is placed.

3.4 WATER TEST:

- A. Test in presence of Resident Engineer for leaks before permanent finish is applied over shower pan waterproofing.
- B. Seal floor drain watertight and fill waterproofing pan with water to within approximately 25 mm (1 inch) of top of its vertical surfaces.
- C. When leakage occurs, repair waterproofing and repeat testing until no leakage occurs.
- D. Submit certificate to Resident Engineer of test results.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermal insulation.
 - a. Board or block insulation at foundation perimeter.
 - b. Batt or blanket insulation at exterior framed walls.
 - c. Board or block insulation at masonry cavity walls.
2. Acoustical insulation.
 - a. Batt and blanket insulation at interior framed partitions.

1.2 RELATED REQUIREMENTS

- A. Insulation for Cavity Face of Masonry: Section 04 20 00, UNIT MASONRY.
- B. Safing Insulation: Section 07 84 00, FIRESTOPPING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 1. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 2. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
 3. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 4. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
 5. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 6. C954-15 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness.
 7. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 8. E84-15a - Surface Burning Characteristics of Building Materials.
 9. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.

1.4 SUBMITTALS

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

B. Submittal Drawings:

1. Show insulation type, thickness, and R-value for each location.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Adhesive indicating manufacturer recommendation for each application.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.

1.5 DELIVERY

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

1.6 STORAGE AND HANDLING

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

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

- A. Insulation Thickness:
 1. Provide thickness required by R-value shown on drawings.
 2. Provide thickness indicated when R-value is not shown on drawings.
- B. Insulation Types:
 1. Provide one insulation type for each application.

2.2 THERMAL INSULATION

- A. Perimeter Insulation In Contact with Soil:
 1. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX.
- B. Exterior Framing:
 1. Mineral Fiber Batt: ASTM C665, Type II, Class C, Category I where concealed by thermal barrier.

C. Mineral Fiber: ASTM C665, Type III, Class A at other locations. Masonry Cavity Wall Insulation:

1. Polyisocyanurate Board: ASTM C591, Type I, with vapor retarder facing; maximum permeance 29 ng/Pa/s/sq. m (0.5 perms).

2.3 ACOUSTICAL INSULATION

A. Semi Rigid, Batts and Blankets:

1. Widths and lengths to fit tight against framing.
2. Mineral Fiber Batt or Blankets: ASTM C665
3. Maximum Surface Burning Characteristics: ASTM E84.
 - a. Flame Spread Rating: 25.
 - b. Smoke Developed Rating: 450.

2.4 ACCESSORIES

A. Fasteners:

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

B. Insulation Adhesive:

1. Nonflammable type recommended by insulation manufacturer to suit application.

C. Tape:

1. Pressure sensitive adhesive on one face.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.

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

3.3 THERMAL INSULATION

- A. Perimeter Insulation in Contact with Soil:
 1. Vertical insulation:
 - a. Fill joints of insulation with same material used for bonding.
 - b. Bond polystyrene board to surfaces with adhesive.
 - c. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.
 - d. Install from top to bottom of all footings / foundations on the exterior side. Insulation shall not be visible after final grading.
- B. Exterior Framing or Furring Insulation:
 1. General:
 - a. Open voids are not acceptable.
 - b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
 - c. Pack behind outlets, around pipes, ducts, and services encased in walls.
 - d. Hold insulation in place with pressure sensitive tape.
 - e. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.
 - f. Do not compress insulation beyond acceptable limits given by the manufacturer.
 2. Metal Studs:
 - a. Fasten insulation between metal studs, framing, and furring with pressure sensitive tape continuous along flanged edges.

3. Soffits:

a. Metal Framing:

- 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
- 2) At metal framing systems, install insulation above metal framing at right angles to main runners and framing.
- 3) Cover metal framing members with insulation.

C. Inside Face of Exterior Wall Insulation:

1. Location: On interior face of solid masonry and concrete walls, beams, beam soffits, underside of floors, and to face of studs to support interior wall finish where indicated.
2. Bond insulation to solid vertical surfaces with adhesive. Fill joints with adhesive cement.
3. Fasten board insulation to face of studs with screws, nails or staples. Space fastenings maximum 300 mm (12 inches) on center. Stagger fasteners at board joints. Install fasteners at each corner.
4. Combustible insulation shall not be used on the project.

D. Top of Wall Conditions at Roof Framing:

1. Mineral Wool Insulation to be installed in locations shown on drawings. Compress Mineral Wool Insulation to 50 percent compression.

3.4 ACOUSTICAL INSULATION

A. General:

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

B. Semi Rigid, Batts and Blankets:

1. Semi Rigid Batts and Blankets:

- a. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedments.
- b. Metal Framing:
 - 1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
 - 2) At metal framing systems, install blanket insulation above metal framing at right angles to the main runners or framing.

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, tapered roof insulation, composite nail base insulation, roof substrate board, roof vapor retarder, and roof cover board on new metal deck substrates ready to receive shingle roofing or single-ply roofing membrane.

1.2 RELATED REQUIREMENTS

- A. Wood Cants, Blocking, and Edge Strips: Section 06 10 00, ROUGH CARPENTRY.
- B. Roof Vapor Barrier: Section 07 27 27 AIR & VAPOR BARRIERS.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):
 - 1. Standard 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. ASTM International (ASTM):
 - 1. C1177/C1177M-13 - Glass Mat Gypsum Substrate for Use as Sheathing.
 - 2. C1289-15 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 3. C1396/C1396M-14a - Gypsum Board.
 - 4. D1970/D1970M-15 - Self-Adhering Polymer Modified Bituminous Sheet Materials Used Roofing Underlayment.
 - 5. E84-15a - Surface Burning Characteristics of Building Materials.
 - 6. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.
- D. National Roofing Contractors Association (NRCA):
 - 1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.
- E. U.S. Department of Agriculture (USDA):
 - 1. USDA BioPreferred Program Catalog.
- F. UL LLC (UL):
 - 1. Listed - Online Certifications Directory.
- G. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
 - 1. DOC PS 1-09 - Structural Plywood.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and installation details.
 - a. Nailers, cants, and terminations.
 - b. Layout of insulation showing fastening patterns, 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. Qualifications: Substantiate qualifications meet specifications.
 - 1. Installer.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY

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

1.7 STORAGE AND HANDLING

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

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

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

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Insulation Thermal Performance:
 - 1. Overall Average R-Value: R-30, minimum.
 - 2. Any Location R-Value: R-30, minimum.
- B. Fire and Wind Uplift Resistance: Provide roof insulation complying with requirements specified in Division 07 roofing section.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.

2.3 ADHESIVES

- A. Primer: ASTM D41/D41M.
- B. 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.
- C. 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.
- D. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to adhere roof insulation to substrate or to another insulation layer.
- E. Roof Cement: Asbestos free, ASTM D2822/D2822M, Type I or Type II; or, ASTM D4586/D4586M, Type I or Type II.

2.4 ROOF AND DECK INSULATION

- A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer.
- A. 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.
- B. Tapered Roof Insulation System:
 - 1. Fabricate of polyisocyanurate. Use only one insulation material for tapered sections. Use only factory-tapered insulation.

2. Cut to provide high and low points with crickets and slopes as shown.
3. Minimum thickness of tapered sections; 1/2 inch.
4. Minimum slope 1/48 (1/4 inch per 12 inches).

C. Composite Nail Base Insulated Roof Sheathing:

1. Fire-Retardant-Treated CDX Plywood, Polyisocyanurate-Foam Sheathing: Polyisocyanurate thermal insulation ASTM C1289, Type V, insulation thickness as shown, with fire-retardant-treated CDX Plywood laminated to top surface.
2. Fire-Retardant-Treated CDX Plywood: NIST DOC PS 1, Exposure 1, 5/8 inch thick.
3. Bottom surface faced with felt facers.
4. For use under all locations of metal roof shingles.

2.5 INSULATION ACCESSORIES

A. Vapor Retarder:

1. Self-Adhering Sheet Vapor Retarder: See Section 07 27 27 AIR & VAPOR BARRIERS.

B. Roof Substrate Board:

1. Glass-Mat, Water-Resistant Gypsum Roof Board: ASTM C1177/C1177M, 13 mm (1/2 inch) thick, factory primed.
2. For use under all locations for all roof types directly on roof deck.

C. Roof Cover Board:

1. Per roofing membrane system and manufacturer.
2. For use under all locations of single-ply roofing membrane.

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 roof decks where indicated.
 - 2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
 - 3. Seal penetrations through vapor retarder with roof cement to prevent moisture entry from below.

3.5 INSULATION INSTALLATION

- A. Insulation Installation, General:
 - 1. Base Sheet: Where required by roofing system, install one lapped base sheet specified in Division 07 roofing section by mechanically fastening to roofing substrate before installation of insulation.
 - 2. Cant Strips: Install preformed insulation cant strips at junctures of roofing system with vertical construction.
 - 3. Use same insulation as existing for roof repair and alterations unless specified otherwise.
- B. Insulation Thickness:
 - 1. Thickness of roof insulation shown on drawings is nominal. Provide thickness required to comply with specified thermal performance.
 - 2. Insulation on Metal Decks: Provide insulation in minimum thickness recommended by insulation manufacturer to span deck flutes. Support edges of insulation on metal deck ribs.
 - 3. When actual insulation thickness differs from drawings, coordinate alignment and location of roof drains, flashing, gravel stops, fascias and similar items.
 - 4. Where tapered insulation is used, maintain insulation thickness at high points and roof edges shown on drawings.
 - a. Low Point Thickness: Minimum 38 mm (1-1/2 inches).

5. Use minimum two layers of insulation when required thickness is 68 mm (2.7 inch) or greater.
- C. Lay insulating units with close joints, in regular courses and with end joints staggered.
 1. Stagger joints between layers minimum 150 mm (6 inches).
- D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.
- E. Seal cut edges at penetrations and at edges against blocking with bitumen or roof cement.
- F. Cut to fit tightly against blocking or penetrations.
- G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.
- H. Installation Method:
 1. Mechanically Fastened Insulation:
 - a. Fasten insulation according to requirements in Division 07 roofing section.
 - b. Fasten insulation to resist uplift pressures specified in Division 07 roofing section.

3.6 COVER BOARD INSTALLATION

- A. Install cover boards over insulation with long joints in continuous straight lines with staggered end joints.
- B. Offset cover board joints from insulation joints 150 mm (6 inches), minimum.

3.7 ROOF ASSEMBLY SCHEDULE

- A. Assembly Under Metal Shingles:
 1. Metal Shingles (Top)
 2. Temperature-Rated Roof Underlayment
 3. 2.6 inch Nailbase ISO Insulation with 5/8 inch Plywood Facer
 4. 2.6 inch ISO Insulation
 5. Self-Adhered Air and Vapor Barrier
 6. Roof Substrate Board
 7. Structural Metal Deck
- B. Assembly Under Standing Seam Metal Roofs:
 1. Standing Seam Metal Roof (Top)
 2. Temperature-Rated Roof Underlayment
 3. 2.6 inch Nailbase ISO Insulation with 5/8 inch Plywood Facer
 4. 2.6 inch ISO Insulation

5. Self-Adhered Air and Vapor Barrier
 6. Roof Substrate Board
 7. Structural Metal Deck
- C. Assembly Under Membrane Roofs:
1. Membrane Roof (Top)
 2. Roof Cover Board
 3. 2.6 inch ISO Insulation
 4. 2.6 inch ISO Insulation
 5. Self-Adhered Air and Vapor Barrier
 6. Roof Substrate Board
 7. Structural Metal Deck
- D. Assembly Under Membrane Roof over Carport:
1. Membrane Roof (Top)
 2. Roof Cover Board
 3. Structural Long Span Metal Deck
- E. Assembly Under Membrane Roof over East Public Vestibule:
1. Membrane Roof (Top)
 2. Roof Cover Board
 3. 2.6 inch ISO Insulation
 4. 2.6 inch ISO Insulation
 5. Self-Adhered Air and Vapor Barrier
 6. Roof Substrate Board
 7. Structural Long Span Metal Deck

- - E N D - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 07 27 27
AIR & VAPOR BARRIERS
(WALLS & ROOF)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fluid-applied vapor-retarding air barrier at exterior above grade wall and roof assemblies.
 - 2. Connection to adjacent air barrier components providing a durable, continuous, full building air barrier.

1.2 RELATED REQUIREMENTS

- A. General Quality Assurance and Quality Control Requirements: Section 01 45 29 TESTING LABORATORY SERVICES.
- B. Masonry Unit Air Barrier Substrates: Section 04 20 00 UNIT MASONRY.
- C. Flashing Components of Factory Finished Roofing and Wall Systems Air Barriers Requiring Air Barrier Transitions: Division 07 roofing and wall system sections.
- D. Metal Flashing Requiring Air Barrier Transitions: Section 07 60 00 FLASHING AND SHEET METAL.
- E. Joint Sealants: Section 07 92 00 JOINT SEALANTS.
- F. Exterior Wall Openings Requiring Air Barrier Transitions: Division 08 sections for aluminum-framed entrances and storefronts, aluminum windows, louvers and vents.
- G. Wall Sheathings Air Barrier Substrates: Section 09 29 00 GYPSUM BOARD.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. Air Barrier Association of America (ABAA):
 - 1. Quality Assurance Program.
- C. ASTM International (ASTM):
 - 1. C920-14a - Elastomeric Joint Sealants.
 - 2. C1193-13 - Use of Joint Sealants.
 - 3. D412-06a(2013) - Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - 4. E84-15a - Surface Burning Characteristics of Building Materials.
 - 5. E96/E96M-15 - Water Vapor Transmission of Materials.
 - 6. E162-15a - Surface Flammability of Materials Using a Radiant Heat Energy Source.

7. E783-02(2010) - Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 8. E1186-03(2009) - Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
 9. E2178-13 - Air Permeance of Building Materials.
 10. E2357-11 - Determining Air Leakage of Air Barrier Assemblies.
- D. U.S. Environmental Protection Agency (EPA):
1. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Consumer and Commercial Products.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
1. Indicate size, configuration, and fabrication and installation details.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Installation instructions including substrate preparation instructions and recommendations.
- C. Sustainable Construction Submittals:
1. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- D. Test reports:
1. Submit field inspection and test reports.
- E. Certificates: Certify each product complies with specifications.
- F. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer with project experience list.
 2. Installer with project experience list.
 - a. Certify installer approval by air barrier manufacturer.

1.5 QUALITY ASSURANCE

- A. Coordinate work with adjacent and related work to provide continuous, unbroken, durable air barrier system.
- B. Manufacturer Qualifications:
1. Regularly and presently manufactures specified products.
 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
- C. Installer Qualifications:
1. Regularly and presently installs specified products.

2. Approved by manufacturer.
3. Applicators trained and certified by manufacturer of air barrier system.
4. Full time on-site field supervisor has completed three projects of similar scope within last year.
5. Field Supervisor: Holds Sealant, Waterproofing, and Restoration Institute (SWRI) Wall Coating Validation Program Certificate, or similar qualification acceptable to Contracting Officer's Representative.

D. Testing Agency Qualifications:

1. Accredited by International Accreditation Service, Inc. or American Association for Laboratory Accreditation.
2. Staff experienced in installation of specified system and qualified to perform observation and inspection specified and determine compliance with project requirements.

1.6 DELIVERY

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

1.7 STORAGE AND HANDLING

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

1.8 FIELD CONDITIONS

- A. Environment:
 1. Work Area Ambient Temperature Range: 4 to 32 degrees C (40 to 90 degrees F) continuously, beginning 48 hours before installation.
- B. Surface Requirements: visibly dry, and complying with manufacturer's instructions.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN:

- A. Walls: Tremco Fluid-Applied Membrane Air Barrier, Vapor-Retarding ExoAir 130 or approved equal.
- B. Roofs: Carlisle VapAir Seal 725T Air and Vapor Barrier or approved equal.

2.2 SYSTEM PERFORMANCE

- A. Air-Barrier Assembly Air Leakage: Maximum 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure when tested according to ASTM E2357.
- B. Provide full system of compatible materials under conditions of service and application required. Compatibility based on testing by material manufacturer.
- C. Perform as continuous vapor retarding air barrier and moisture drainage plane.
- D. Transition to adjacent flashings and discharge water to building exterior.
- E. Accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

2.3 PRODUCTS - GENERAL

- A. Provide air barrier system components from one manufacturer.

2.4 AIR BARRIER

- A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier:
 - 1. Elastomeric, modified bituminous or synthetic polymer membrane.
 - 2. Air Permeance: ASTM E2178: 0.2 L/s/sq. m (0.04 cfm/sq. ft.) of surface area at 75 Pa (1.57 psf) differential pressure.
 - 3. Vapor Permeance: ASTM E96/E96M: Maximum 5.8 ng/Pa/s/sq. m (0.1 perms).
 - 4. Elongation: Ultimate, ASTM D412, Die C: 500 percent, minimum.
 - 5. Thickness: Minimum 1.0 mm (40 mils) dry film thickness, applied in single continuous coat.
 - 6. Surface Burning Characteristics: When tested according to ASTM E84S.
 - a. Flame Spread Rating: 25 maximum.
 - b. Smoke Developed Rating: 450 maximum.

B. Air and Vapor Barrier Sheets

1. Composite aluminum foil with tenacious self-adhesive SBS backing and removable poly release film.
2. Air Permeance: ASTM E2178: 0.0 L/s/sq. m (0.00 cfm/sq. ft.) of surface area at 75 Pa) differential pressure.
3. Vapor Permeance: ASTM E96 D1970: Maximum 0.03 perms.
4. Water Vapor Resistance: BS EN ISO 12572. 4,310 MNs/g.
5. Tear Strength: ASTM D1970. 135lbf.
6. Puncture Resistance: ASTM D5602. 54.6 lb.
7. Thickness: Minimum .015 inches
8. Elongation: ASTM D1970. 330%

- C. Roof Air and Vapor Barrier at Perimeter: Continue membrane over construction to the same extent as the membrane roof or completely over fascia boards.

2.5 ACCESSORIES

- A. Primer: Waterborne primer complying with VOC requirements, recommended air barrier manufacturer to suit application.
- B. Counterflashing Sheet: Modified bituminous, minimum 1.0 mm (40 mils) thick, self-adhering composite sheet consisting of minimum 0.8 mm (33 mils) of rubberized asphalt laminated to polyethylene film.
- C. Substrate Patching Material: Manufacturer's standard trowel-grade filler material.
- D. Sprayed Polyurethane Foam Sealant: Foamed-in-place, 24 to 32 kg/cu. m (1.5 to 2.0 pcf) density, with maximum flame-spread index of 25 when tested according to ASTM E84.
- E. Flexible Opening Transition: Cured low-modulus silicone extrusion with reinforcing ribs, sized to fit opening widths, designed for adhesion to or insertion into aluminum framing extrusions, and compatible with air barrier system materials and accessories.
- F. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, approved by membrane air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.

PART 3 - EXECUTION

3.1 PREPARATION

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

1. Remove projections and excess materials and fill voids with substrate patching material.
 2. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Prepare and treat substrate joints and cracks according to ASTM C1193 and membrane air barrier manufacturer's instructions.

3.2 INSTALLATION - AIR BARRIER

- A. Install products according to manufacturer's instructions and approved submittals drawings.
1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
1. Protect substrates from environmental conditions that affect air-barrier performance.
 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
- C. Apply primer.
- D. Install transition strips and accessory materials.
- E. Seal air barrier to adjacent components of building air barrier system.
- F. Install flexible opening transition at each opening perimeter. Extend transition onto each substrate minimum 75 mm (3 inches).
1. Fill gaps at perimeter of openings with foam sealant.
- G. At penetrations, seal transition strips around penetrating objects with termination mastic.
1. Fill gaps at perimeter of penetrations with sprayed polyurethane foam sealant.
- H. At top of through-wall flashings, seal with continuous transition strip of manufacturer's recommended material to suit application.
- I. Apply air barrier in full contact with substrate to produce continuous seal with transitions.
- J. Apply fluid membrane in thickness recommended by manufacturer, and minimum specified thickness.
- K. Leave air barrier exposed until tested and inspected and tested by Contracting Officer's Representative.

- L. Roof Air and Vapor Barrier at Perimeter: Continue membrane over construction to the same extent as the membrane roof or completely over fascia boards.

3.3 FIELD QUALITY CONTROL

- A. Field Inspections and Tests: Performed by qualified testing laboratory.
 - 1. Perform inspections and tests before concealing air barrier with subsequent work.
- B. Inspections:
 - 1. Compatibility of materials within air barrier system and adjacent materials.
 - 2. Suitability of substrate and support for air barrier.
 - 3. Suitability of conditions under which air barrier is applied.
 - 4. Adequacy of substrate priming.
 - 5. Application and treatment of joints and edges of transition strips, flexible opening transitions, and accessory materials.
 - 6. Continuity and gap-free installation of air barrier, transition strips, and accessory materials.
- C. Field Tests:
 - 1. Qualitative air-leakage testing according to ASTM E1186.
 - 2. Quantitative air-leakage testing according to ASTM E783.
 - 3. Dry mil thickness.
- D. Inspection and Test Frequency: Determined by installed air barrier surface area.
 - 1. Up to 900 sq. m (10,000 sq. ft.): One inspection.
 - 2. 901 - 3,300 sq. m (10,001 - 35,000 sq. ft.): Two inspections.
 - 3. 3,300 - 7,000 sq. m (35,001 - 75,000 sq. ft.): Three inspections.
 - 4. 7,001 - 11,600 sq. m (75,001 - 125,000 sq. ft.): Four inspections.
 - 5. 11,601 - 19,000 sq. m (125,001 - 200,000 sq. ft.): Five inspections.
 - 6. Over 19,000 sq. m (200,000 sq. ft.): Six inspections.
- E. Submit inspection and test reports to Contracting Officer's Representative within seven calendar days of completing inspection and test.
- F. Defective Work:
 - 1. Correct deficiencies, make necessary repairs, and retest as required to demonstrate compliance with specified requirements.

3.4 CLEANING

- A. Remove masking materials.

- B. Clean spills and overspray using cleaning agents recommended by manufacturers of affected construction.

3.5 PROTECTION

- A. Protect air barrier from construction operations.
- B. Protect air barrier from exposure to UV light exposure exceeding manufacturer's recommendation.
- C. Replace overexposed materials and retest.

- - E N D - -

SECTION 07 31 14
STONE COATED METAL ROOF SHINGLE

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Provisions established within General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.
- B. Section Includes: Formed metal roofing panels with colored stone chip finish.
- C. Associated metal flashings.
- D. Related Sections:
 - 1. Division 7 Section "Sheet Metal Flashing and Trim" for metal flashing, gutters, and downspouts.
 - 2. Division 7 Section "Joint Sealants" for field-applied sealants.
 - 3. Division 9 Section "Painting" for painting of roof accessories.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, fasteners, accessories, and manufacturers written installation instructions.
- C. Shop Drawings: Include roof plans and elevations; sections at hips, ridges, gables, valleys, and eaves; and details of components, accessories, and attachments to other work.
- D. Samples for Initial Selection: Manufacturer's color charts and samples consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type Shingle indicated.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to applicable building code for roof assembly fire hazard requirements.
 - 2. Conform to building code for minimum wind uplift resistance.

1.4 REFERENCES

- A. Fire-Test-Response Characteristics: Provide Shingle with fire-test-response characteristics indicated, as determined per test method ASTM

E108 - Test for Fire Resistance of Roof Covering Materials, for application and slopes indicated.

1. Fire-Test Exposure: Class A.
- B. ASTM A792/A792M: Sheet Steel, Aluminum-Zinc Alloy Coated by the Hot Dip Process, Structural (physical) Quality.
- C. UL 1897 and UL 580: Wind Uplift Resistance of Roof Assemblies.
- D. ASTM C920: Specification for Elastomeric Joint Sealants.
- E. Impact Resistance: UL 2218, Class 4.
- F. Appraisal Certificates:
 1. International Code Council (ICC), Whittier California, Report No. ESR 1483.
 2. Underwriters Laboratories, Inc., Northbrook, Illinois, USA File No. R14710.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle roofing materials to ensure dryness. Store in a dry, well-ventilated, weather tight place. Protect from corrosion, staining and traffic and wind damage. Store rolls of sheet materials on end on pallets or another raised surface.

1.6 WARRANTY

- A. Manufacturing Warranty: Written, transferable, limited warranty, covering manufacturing defects. Refer to warranty for specifics.
 1. Warranty Period: 50 years from date of Substantial Completion.
 2. Wind Warranty: 120 mph winds, full warranty period.
 3. Hail Penetration: full warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Shingle: Three course formed interlocking panels resembling dimensional roofing shingles.
 1. Basis-of-Design: EDCO ArrowLine Slate 1755-294 EDC892C
 - a. Material: Steel.
 - b. Finish: PVDF
 - c. Thickness: 0.0165 inches (.455 mm).
 - d. Steel: Grade 37 (Grade 255).
 - e. Size: 21" wide by 52" long (533 by 1321 mm).
 - f. Exposure: 19-3/4" wide by 49" long (368 by 1270 mm).
 - g. Weight: 125 pounds per square.
 - h. Impact Rating: UL Class 4.
 - i. Color: Charcoal Grey Blend. See Section 09 06 00 Schedule for Finishes.
- B. Flashing:
 1. Valley: Shingle Valley and Cap, Aluminum-Zinc Alloy coated Steel sheet 0.0165 inches (.455 mm). Pressure formed into a valley with

- a stone coated valley cap. Finish: Match upper exposed stone coated surface of the valley cap to the shingle material/color.
2. Fascia Metal: Shingle Starter Clip w/ Drip Edge, Aluminum-Zinc Alloy Coated Steel sheet, 0.0165 inches (.455 mm). Pressure formed to fit along the leading edge of roof panels at eave/fascia.
 3. Rake / Gable Channel: Shingle Rake/Gable Channel, Aluminum-Zinc Alloy Coated Steel sheet, 0.0165 inches (.455 mm). Pressure formed to match roofing material to be applied along rakes and gables. Pre-paint to match as needed prior to installing panels.
 4. Short Course Clip: Shingle Short Course Clip, Aluminum-Zinc Alloy Coated Steel sheet, 0.0165 inches (.455 mm). Pressure formed for use with starting a short course or when Shingle Starter Clip w/ Drip Edge will not conform to existing eave/fascia.
 5. Pipe Jack Flashing: 0.0165 inches (.455 mm) galvanized or Aluminum-Zinc Alloy Coated Steel, clean, prime and paint to match roof material.
 6. Underpan: Aluminum-Zinc Alloy Coated Steel sheet, 0.0165 inches (.455 mm), pressure formed to counter flash roof penetrations matching Shingle material profile.
- C. Hip & Ridge: Shingle Hip & Ridge covers hips and ridges matching shingle material, color, and finish.
1. Hips / Ridges: Shingle Hip & Ridge, Aluminum-Zinc Alloy Coated Steel sheet, 0.0165 inches (.455 mm). Pressure formed to match roofing material, color, and finish to be applied along hips and ridges.
 2. Screws: Minimum No. 9 hex (1/4" diameter) by 1-1/2" long (38.1 mm) minimum, corrosion resistant, color coordinated to match the panels.

2.2 ACCESSORIES

- A. Sheet Metal Materials: Aluminum-Zinc Alloy Coated Steel sheet: ASTM A 792/A 792M, Class AZ50 (AZ150) coating designation; minimum Grade 37 (Grade 255).
- B. Shingle underlayment: Apply under entirety of metal shingle installation. Rolled synthetic at manufacturer's standard for overlapping. Rolled horizontally, lapped to shed water. Fastening per manufacturer. Temperature and combustibility resistance must be compliant with metal shingle manufacturer's recommendations.

- C. Perimeter Underlayment: ASTM D 1970; self-adhering, polymer-modified, bituminous sheet underlayment; 40 mils (1 mm) thick. Provide primer when recommended by underlayment manufacturer.
- D. Sealant: One-part elastomeric polyurethane, sealant as recommended in writing by panel manufacturer. Where sealant will be exposed, provide in color to match panels.
 - 1. Standard: ASTM C920-86.
- E. Fasteners: Per shingle manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate and conditions for compliance with requirements for maximum moisture content, soundness of roof deck and other conditions affecting performance of metal roofing.. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of any projections and substances detrimental to metal panel roofing. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with roofing nails.
- B. Coordinate installation of metal shingles with roof deck, flashing and other adjoining work to ensure proper sequencing. Do not install roofing until vent stacks and other penetrations through roofing have been installed, are securely fastened and flashing is in place.
- C. Inspect and verify exterior stucco and EIFS wall enclosures are completed.

3.3 INSTALLATION

- A. General: Comply with manufacturer's written instructions for products and applications indicated, unless more stringent requirements apply.
- B. Underlayment: Apply number of plies required by governing code, but at least one ply, with each ply overlapping the ply below at least 6 inches (152 mm) and ends lapped at least 18 inches (457 mm).
- C. Perimeter Underlayment: Apply minimum 24 inches (609 mm) wide layer of perimeter underlayment along entire perimeter of surface to receive metal shingles, including at eaves, ridges, edges, hips, valley, skylights, dormers, and around projections through roof. Extend perimeter underlayment a minimum of 36 inches (914 mm) inside exterior wall line at edges.
- D. Valleys: Install in accordance with manufacturer's instructions with a minimum 6 inch (152 mm) overlap in direction of flow.

- E. Flashing: Install as indicated on approved submittals and in accordance with manufacturer's written instructions.
- F. Shingle Panels: Install Shingle, accessories, flashing, and hip & ridge level and plumb. Use fasteners per above specifications.
1. Using the recommended offset, the first course of panels lock into the Shingle Starter Clip w/ Drip Edge.
 2. The second course of panels start at the rake edge, valley or hip with a panel that is 28 inches (711 mm) in length, panel exposure is 25 inches (635 mm), measured from the left side of the panel.
 3. Position the panel into the top clip of the panels on the course below. The center of each field panel will be placed directly above the overlap of the panels on the previous course.
 4. Make sure the top clips of each panel are flush. The maximum allowable gap should be 3/16 inches (76 mm).
 5. Once the panel is in position, firmly push (by hand or foot) on the panel in the area that overlaps the joint of the two panels below. This will help position the panel for fastener placement.
 6. After positioning the panel, firmly push (by hand or foot) on the left side of the panel until it is locked firmly into the clip-lock of the panel on the course below. Install a fastener in the upper left corner straight down through the panel.
 7. Firmly push (by hand or foot) on the right side of the panel and make sure it is locked into the previously installed panel. Install a fastener in the upper right portion of the panel. Placing this fastener at a slight upward angle (45°) will help draw the shingle panel into the proper locking position. Complete the installation with 2 additional fasteners straight down into the panel.
 8. Fasten each panel with minimum [4] fasteners along top edge of panel.
 9. Cut and slot panels that will terminate at the Shingle Rake/Gable Channel or at the Valley in accordance with the manufacturer's instructions.
- G. Hip & Ridge: Install Shingle Hip & Ridge along hips, ridges and rakes as indicated on approved submittals and in accordance with manufacturers written instructions. Bend and fold exposed ends of hips ridges and neatly, cap with an end cap or a piece of similar material.

3.4 CLEANING AND PROTECTION

- A. Damaged Units: Replace panels and other components of the work that have been dented, damaged or have deteriorated beyond successful repair by finish touchup with acrylic coating and stone chip granules.
- B. Cleaning: After completing installation, remove any debris from the roof.
- C. Foot Traffic: Avoid walking on side laps.

- - - E N D - - -

SECTION 07 53 23

ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ethylene Propylene Diene Monomer (EPDM) sheet roofing adhered to insulated metal roof deck.

1.2 RELATED REQUIREMENTS

- A. Substrate Board, Vapor Retarder, Roof Insulation, and Cover Board: Section 07 22 00, ROOF AND DECK INSULATION.
- B. Roof Membrane Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
 1. FX-1-01(R2006) - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
 2. RP-4 2013 - Wind Design Standard for Ballasted Single-ply Roofing Systems.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
 1. 7-10 - Minimum Design Loads For Buildings and Other Structures.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. ASTM International (ASTM):
 1. A276/A276M-15 - Stainless Steel Bars and Shapes.
 2. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 3. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 4. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
 5. C140/C140M-15 - Sampling and Testing Concrete Masonry Units and Related Units.
 6. C936/C936M-15 - Solid Concrete Interlocking Paving Units.
 7. C1371-15 - Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

8. C1549-09(2014) - Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
9. D751-06(2011) - Coated Fabrics.
10. D1248-12 - Polyethylene Plastics Extrusion Materials for Wire and Cable.
11. D1876-08(2015)e1 - Peel Resistance of Adhesives (T-Peel Test).
12. D2103-15 - Polyethylene Film and Sheeting.
13. D2240-05(2010) - Rubber Property-Durometer Hardness.
14. D3884-09(2013)e1 - Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method).
15. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
16. D4586/D4586M-07(2012)e1 - Asphalt Roof Cement, Asbestos-Free.
17. D4637/D4637M-14e1 - EPDM Sheet Used In Single-Ply Roof Membrane.
18. E96/E96M-15 - Water Vapor Transmission of Materials.
19. E408-99(2015) - Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
20. E1918-06(2015) - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. E1980-11 - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
22. G21-15 - Resistance of Synthetic Polymeric Materials to Fungi.
- F. Cool Roof Rating Council (CRRC):
 1. 1-15 - Product Rating Program.
- G. Federal Specifications (Fed. Spec.):
 1. UU-B-790A - Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant).
- H. Florida Department of Business and Professional Regulation (FL):
 1. Approved - Product Approval.
- I. National Roofing Contractors Association (NRCA):
 1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.
- J. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog.
- K. UL LLC (UL):
 1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.
 2. 1897-15 - Uplift Tests for Roof Covering Systems.
- L. U.S. Department of Commerce National Institute of Standards and Technology (NIST):
 1. DOC PS 1-09 - Structural Plywood.
 2. DOC PS 2-04 - Performance Standard for Wood-Based Structural-Use Panels.

- M. U.S. Environmental Protection Agency (EPA):
 - 1. Energy Star - ENERGY STAR Program Requirements for Roof Products, latest version.

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. Inspection and Testing Agency.
 - c. Contractor.
 - d. Installer.
 - e. Manufacturer's field representative.
 - f. Other installers responsible for adjacent and intersecting work, including roof deck, flashings, roof specialties, roof accessories, utility penetrations, rooftop curbs and equipment.
 - 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.
- D. Certificates: Certify products comply with specifications.
1. Fire and windstorm classification.
- E. Qualifications: Substantiate qualifications comply with specifications.
1. Installer, including supervisors with project experience list.
 2. Manufacturer's field representative with project experience list.
- F. Field quality control reports.
- G. Operation and Maintenance Data:
1. Maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Approved by roofing system manufacturer as installer for roofing system with specified warranty.
 2. Regularly installs specified products.
 3. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
 4. Employs full-time supervisors experienced installing specified system and able to communicate with Contracting Officer's Representative and installer's personnel.
- B. Manufacturer's Field Representative:
1. Manufacturer's full-time technical employee or independent roofing inspector.
 2. Individual certified by Roof Consultants Institute as Registered Roof Observer.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, 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, including covering membrane, roof insulation, and membrane accessories, 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: 30 years.
 - 2. Limit of Liability: No dollar limitation.
 - 3. Scope of Coverage: Repair leaks in the roofing system caused by:
 - a. Ordinary wear and tear of the elements.
 - b. Manufacturing defect in Firestone brand materials.
 - c. Defective workmanship used to install these materials.
 - d. Damage due to winds up to 100 mph.
 - 4. Not Covered:
 - a. Damage due to winds in excess of 100 mph.
 - b. Damage due to hurricanes or tornadoes.
 - c. Hail.
 - d. Intentional damage.
 - e. Unintentional damage due to normal rooftop inspections, maintenance, or service.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

2.2 SYSTEM PERFORMANCE

- A. Design roofing system meeting specified performance:
 - 1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
 - a. EPA Energy Star Listed for low-slope roof products.
 - b. 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:
 - 2. Calculate compliance adjusting initial solar reflectance according to ASHRAE 90.1.
 - 3. 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: Firestone RubberGuard EPDM Platinum.
- B. Provide roof system components from one manufacturer.

2.4 EPDM ROOFING MEMBRANE

- A. EPDM Sheet: ASTM D4637/D4637M, Type I - Reinforced.
 - 1. Thickness: 90 mils
 - 2. Color: Black. See Section 09 06 00, SCHEDULE OF FINISHES.

B. Additional Properties:

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

		discoloration.
--	--	----------------

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

2.5 MEMBRANE ACCESSORY MATERIALS

- A. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- B. Flashing Membrane: Self-curing, non-reinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D 4811 Type II, and with the following properties:
 1. Thickness: 0.055 inch (1.4 mm).
 2. Color: Same as field membrane
 3. Acceptable Product: RubberGard EPDM FormFlash by Firestone.
- C. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil (0.9 mm) EPDM tape adhesive; QuickSeam Flashing by Firestone.
- D. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Firestone EPDM Pipe Flashing.
- E. Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape by Firestone.
- F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive by Firestone.
- G. Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings; Bonding Adhesive BA-2004 by Firestone.
- H. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive, with VOC content less than 2.1 lb/gal (250 g/L); QuickPrime Plus LVOC by Firestone.
- I. Low Rise Foam Adhesive: Two-component, low-rise polyurethane adhesive designed to attach polyisocyanurate insulation to a variety of

acceptable substrates; ISO Stick by Firestone.

- J. Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS by Firestone.
- K. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
- L. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal by Firestone.
- M. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.
 - 1. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick; Firestone Termination Bar by Firestone.
- N. Roof Walkway Pads: EPDM, 0.30 inch (7.6 mm) thick by 30 by 30 inches (760 by 760 mm) with EPDM tape adhesive strips laminated to the bottom; QuickSeam Walkway Pads by Firestone.

2.6 SEPARATION SHEET

- A. Polyethylene Film: ASTM D2103, 0.2 mm (6 mils) thick.

2.7 FLEXIBLE TUBING

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

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

3.3 TEMPORARY PROTECTION

- A. Install temporary protection consisting of a temporary seal and water cut-offs at the end of each day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
- B. Install temporary cap flashing over top of base flashings where permanent flashings are not in place to protect against water intrusion into roofing system. Securely anchor in place to prevent blow off and damage by construction activities.

- C. Temporarily seal exposed insulation surfaces within roofing membrane.
 - 1. Apply temporary seal and water cut off by extending roofing membrane beyond insulation and securely embedding edge of the roofing membrane in 6 mm (1/4 inch) thick by 50 mm (2 inches) wide strip of temporary closure sealant. Weight roofing membrane edge with sandbags, to prevent displacement; space sandbags maximum 2400 mm (8 feet) on center.
 - 2. Direct water away from work. Provide drainage, preventing water accumulation.
 - 3. Check daily to ensure temporary seal remains watertight. Reseal open areas and weight down.
- D. Before the work resumes, cut off and discard portions of roof membrane in contact with temporary seal.
 - 1. Cut minimum 150 mm (6 inches) back from sealed edges and surfaces.
- E. Remove sandbags and store for reuse.

3.4 INSTALLATION, GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Comply with NRCA Manual installation requirements.
- C. Comply with UL 580 or UL 1897 for uplift resistance.
- D. Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil, grease, or other substances incompatible with EPDM.

3.5 ROOFING INSTALLATION

- A. Install membrane perpendicular to long dimension of insulation boards.
- B. Begin membrane installation at roof low point and work towards high point. Lap membrane shingled in water flow direction.
- C. Position membrane free of buckles and wrinkles.
- D. Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas:
 - 1. Allow 30 minutes for membrane to relax before proceeding.
 - 2. Lap edges and ends minimum 75 mm (3 inches). Clean lap surfaces.
 - 3. Install seam adhesive or tape, unless furnished with factory applied adhesive strips. Apply pressure to develop full adhesion.

4. Check seams to ensure continuous adhesion and correct defects.
5. Finish seam edges with beveled bead of lap sealant.
6. Finish seams same day as membrane is installed.
7. Anchor membrane perimeter to roof deck and parapet wall as indicated on drawings.

E. Membrane Perimeter Anchorage:

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

F. Adhered System Installation:

1. Apply bonding adhesive in quantities required by roofing membrane manufacturer.
2. Fold sheet back on itself, clean and coat the bottom side of the membrane and the top of substrate with adhesive. Do not coat the lap joint area.
3. After adhesive has set according to adhesive manufacturer's instructions, roll roofing membrane into adhesive minimizing voids and wrinkles.
4. Repeat for other half of sheet.

5. Cut voids and wrinkles to lay flat. Clean and patch cut area.

3.6 FLASHING INSTALLATION

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

3. Install flexible tubing 1-1/2 times width of joint centered over joint. Cover tubing with flashing sheet adhered to base flashing and lapping base flashing roofing manufacturer's standard dimension. Finish edges of laps with lap sealant.

E. Repairs to Membrane and Flashings:

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

3.7 FIELD QUALITY CONTROL

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.

1. Fastener Pull Out Tests: ANSI/SPRI FX-1; one test for every 230 sq. m (2,500 sq. ft.) of deck. Perform tests for each combination of fastener type and roof deck type before installing roof insulation.

- a. Test at locations selected by Contracting Officer's Representative.
- b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.

c. Test Results:

Repeat tests using different fastener type or use additional fasteners achieve pull out resistance required to meet specified wind uplift performance.

Patch cementitious deck to repair areas of fastener tests holes.

2. Examine and probe roofing membrane and flashing seams in presence of Contracting Officer's Representative and Manufacturer's field representative.
3. Probe seams to detect marginal bonds, voids, skips, and fishmouths.
4. Cut 100 mm (4 inch) wide by 300 mm (12 inch) long samples through seams where directed by Contracting Officer's Representative.
5. Cut one sample for every 450 m (1500 feet) of seams.
6. Cut samples perpendicular to seams.
7. Failure of samples to pass ASTM D1876 test will be cause for rejection of work.

8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
9. Repair fishmouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.

B. Manufacturer Services:

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

3.8 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed roofing surfaces. Remove contaminants and stains.

3.9 PROTECTION

- A. Protect roofing system from traffic and construction operations.
 1. Protect roofing system when used for subsequent work platform, materials storage, or staging.
 2. Distribute scaffolding loads to exert maximum 50 percent roofing system materials compressive strength.
- B. Loose lay temporary insulation board overlaid with plywood or OSB.
 1. Weight boards to secure against wind uplift.
- C. Remove protection when directed by Contacting Officer's Representative.
- D. Repair damage.

- - E N D - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

- A. Flashing components of factory finished roofing and wall systems:
Division 07 roofing and wall system sections.
- B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Color of factory coated exterior architectural metal and anodized aluminum items: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Integral flashing components of manufactured roof specialties and accessories or equipment: Division 22, PLUMBING sections and Division 23 HVAC sections.
- E. Paint materials and application: Section 09 91 00, PAINTING.
- F. Flashing of Roof Drains: Section 22 14 00, FACILITY STORM DRAINAGE.

1.3 APPLICABLE PUBLICATIONS

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

D. American Architectural Manufacturers Association (AAMA):

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

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

E. ASTM International (ASTM):

A240/A240M-14.....Standard Specification for Chromium and
Chromium-Nickel Stainless Steel Plate, Sheet
and Strip for Pressure Vessels and for General
Applications.

A653/A653M-11.....Steel Sheet Zinc-Coated (Galvanized) or Zinc
Alloy Coated (Galvanized) by the Hot- Dip
Process

B32-08.....Solder Metal

B209-10.....Aluminum and Aluminum-Alloy Sheet and Plate

B370-12.....Copper Sheet and Strip for Building
Construction

D173-03 (R2011).....Bitumen-Saturated Cotton Fabrics Used in
Roofing and Waterproofing

D412-06 (R2013).....Vulcanized Rubber and Thermoplastic Elastomers-
Tension

D1187-97 (R2011).....Asphalt Base Emulsions for Use as Protective
Coatings for Metal

D1784-11.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and
Chlorinated Poly (Vinyl Chloride) (CPVC)
Compounds

D3656-07.....Insect Screening and Louver Cloth Woven from
Vinyl-Coated Glass Yarns

D4586-07.....Asphalt Roof Cement, Asbestos Free

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

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

AMP 500-06.....Metal Finishes Manual

- H. Federal Specification (Fed. Spec):
 - A-A-1925A.....Shield, Expansion; (Nail Anchors)
 - UU-B-790A.....Building Paper, Vegetable Fiber
- I. International Code Commission (ICC): International Building Code, Current Edition

1.4 PERFORMANCE REQUIREMENTS

- A. Wind Design Standard: Fabricate and install copings and roof-edge flashings tested per ANSI/SPRI ES-1 to resist design pressure indicated on Structural Drawings, 07 53 23 METAL SHINGLES, 07 61 16 METAL ROOFING, and 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.

1.5 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

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

- D. Copper Covered Paper: Fabricated of electro-deposit pure copper sheets ASTM B 370, bonded with special asphalt compound to both sides of creped, reinforced building paper, UU-B-790, Type I, style 5, or to a three ply sheet of asphalt impregnated creped paper. Grooves running along the width of sheet.
- E. Polyethylene Coated Copper: Copper sheet ASTM B370, weighing 1 Kg/m² (3 oz/sf) bonded between two layers of (two mil) thick polyethylene sheet.
- F. Aluminum Sheet: ASTM B209, alloy 3003-H14 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.
- G. Galvanized Sheet: ASTM, A653.
- H. Nonreinforced, Elastomeric Sheet: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheet 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. Sheet shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m² (6 lbs/100 sf).
- C. Bituminous Paint: ASTM D1187, Type I.
- D. Fasteners:
 - 1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
 - 2. Nails:
 - a. Minimum diameter for copper nails: 3 mm (0.109 inch).
 - b. Minimum diameter for aluminum nails 3 mm (0.105 inch).
 - c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.

- d. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
- 3. Rivets: Not less than 3 mm (1/8 inch) diameter.
- 4. Expansion Shields: Fed Spec A-A-1925A.
- E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- F. Insect Screening: ASTM D3656, 18 by 18 regular mesh.
- G. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
- B. Concealed Locations (Built into Construction):
 - a. Stainless steel: 0.25 mm (0.010 inch) thick.
- C. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

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

6. Soldering:

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

B. Expansion and Contraction Joints:

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

C. Cleats:

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

D. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips of 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.

E. Drips:

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

F. Edges:

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

G. Metal Options:

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

2.5 FINISHES

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 - 1. Steel and Galvanized Steel:
 - a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.
 - b. Manufacturer's finish:
 - i. Baked on prime coat over a phosphate coating.
 - ii. Baked-on prime and finish coat over a phosphate coating.
 - iii. Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 DOOR FLASHINGS

- A. Door Sill Flashing:
 - 1. Where concealed, use either 0.5 Kg (20 oz) copper, 0.5 mm (0.018 inch) thick stainless steel, or 0.5 mm (0.018 inch) thick copper clad stainless steel.
 - 2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 0.6 Kg (24 ounce) copper, 0.6 mm (0.024 inch) stainless steel, or 0.6 mm (0.024 inch) thick stainless steel.
 - 3. Fabricate flashing at ends to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening with folded corners.

2.7 COUNTERFLASHING (CAP FLASHING OR HOODS)

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

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

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

2.8 HANGING GUTTERS

3. 0.8mm (0.032 inch) thick aluminum.
- B. Fabricate hanging gutters in sections not less than 2400 mm (8 feet) long, except at ends of runs where shorter lengths are required.
- C. Building side of gutter shall be not less than 38 mm (1 1/2 inches) higher than exterior side.
- D. Gutter Bead: Stiffen outer edge of gutter by folding edge over approximately 19 mm (3/4 inch) toward roof and down approximately 19 mm (3/4 inch) unless shown otherwise.
- E. Gutter Spacers:
 1. Fabricate of same material and thickness as gutter.
 2. Fabricate 25 mm (one inch) wide strap and fasten to gutters not over 900 mm (36 inches) on center.
 3. Turn back edge up 25 mm (one inch) and lap front edge over gutter bead.
 4. Rivet and solder to gutter except rivet and seal to aluminum.
- F. Outlet Tubes:
 1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch). Flange upper end of outlet tube 13 mm (1/2 inch).
 2. Lock and solder longitudinal seam except use sealant in lieu of solder with aluminum.
 3. Solder tube to gutter. Seal aluminum tube to gutter and rivet to gutter.
 4. Fabricate basket strainers of same material as gutters.
- G. Gutter Brackets:
 1. Fabricate of same metal as gutter. Use the following:
 - a. 6 by 25 mm (1/4 by 1 inch) aluminum.
 2. Fabricate to gutter profile.
 3. Drill two 5 mm (3/16 inch) diameter holes in anchor leg for countersunk flat head screws.

2.9 CONDUCTORS (DOWNSPOUTS)

- A. Fabricate conductors of same metal and thickness as gutters in sections approximately 3000 mm (10 feet) long [with 19 mm (3/4 inch) wide flat locked seams].
 - 1. Fabricate open face channel shape with hemmed longitudinal edges.
- B. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.
- C. Fabricate conductor brackets or hangers of same material as conductor, 2 mm (1/16 inch) thick by 25 mm (one inch) minimum width. Form to support conductors 25 mm (one inch) from wall surface in accordance with Architectural Sheet Metal Manual Plate 34, Design C for rectangular shapes and E for round shapes.
- D. Conductor Heads:
 - 1. Fabricate of same material as conductor.
 - 2. Fabricate conductor heads to not less than 250 mm (10 inch) wide by 200 mm (8 inch) deep by 200 mm (8 inches) from front to back.
 - 3. Form front and side edges channel shape not less than 13 mm (1/2 inch) wide flanges with edge hemmed.
 - 4. Slope bottom to sleeve to conductor or downspout at not less than 60 degree angle.
 - 5. Extend wall edge not less than 25 mm (one inch) above front edge.
 - 6. Solder joints for water tight assembly.
 - 7. Fabricate outlet tube or sleeve at bottom not less than 50 mm (2 inches) long to insert into conductor.

2.10 REGLETS

- A. Fabricate reglets of one of the following materials:
 - 1. Plastic coated extruded aluminum, not less than 1.4 mm (0.055 inch) thick prefilled with butyl rubber sealer and complete with plastic wedges inserted at 1000 mm (40 inches) on centers.
 - 2. Plastic, ASTM D1784, Type II, not less than 2 mm (0.075 inch) thick.
- B. Fill open-type reglets with fiberboard or other suitable separator, to prevent crushing of the slot during installation.
- C. Bend edges of reglets for setting into concrete to an angle of not less than 45 degrees, and make wide enough to provide firm anchorage in the concrete.

- D. Fabricate reglets for building into horizontal masonry mortar joints not less than 19 mm (3/4 inch) deep, nor more than 25 mm (one inch) deep.
- E. Fabricate mitered corners, fittings, and special shapes as may be required by details.
- F. Reglets for concrete may be formed to receive flashing and have a 10 mm (3/8 inch), 45 degree snap lock.

2.11 GOOSENECK ROOF VENTILATORS

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
 - 2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
 - 3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
 - 4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.

5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
7. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.

15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
17. Bitumen Stops:
 - a. Install bitumen stops for built-up roof opening penetrations through deck and at formed sheet metal gravel stops.
 - b. Nail leg of bitumen stop at 300 mm (12 inch) intervals to nailing strip at roof edge before roofing material is installed.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.

11. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
 12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
 13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
 14. Continue flashing around columns:
 - a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
 - b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).
- B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.
- C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).
- D. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
 2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
 3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.
- E. Door Sill Flashing:
1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
 2. Extend sill flashing 200 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.

3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 150 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

3.3 BASE FLASHING

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

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

- A. General:
 1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
 2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
 3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.

4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
 5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
 6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.
- B. One Piece Counterflashing:
1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
 2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
 3. Where flashing is surface mounted on flat surfaces.
 - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
 - 1) Locate fasteners in masonry mortar joints.
 - 2) Use screws to sheet metal or wood.
 - b. Fill joint at top with sealant.
 4. Where flashing or hood is mounted on pipe.
 - a. Secure with draw band tight against pipe.
 - b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
 - c. Completely fill joint at top with sealant.
- C. Two-Piece Counterflashing:
1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
 2. Surface applied type receiver:
 - a. Secure to face construction in accordance, with manufacturers instructions.
 - b. Completely fill space at the top edge of receiver with sealant.
 3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
- D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

- E. When counter flashing is a component of other flashing install as shown.

3.5 REGLETS

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

3.6 COPINGS

- A. General:
 - 1. On walls topped with a wood plank, install a continuous edge strip on the front edge of the plank. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.
 - 2. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
 - 3. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.
- B. Aluminum Coping:
 - 1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
 - 2. Install joint covers, centered at each joint, and securely lock in place.
- C. Stainless steel Copings:
 - 1. Join ends of sheets by a 19 mm (3/4 inch) locked and soldered seam, except at intervals of 9600 mm (32 feet), provide a 38 mm (1 1/2 inch) loose locked expansion joint filled with sealant or mastic.
 - 2. At straight runs between 7200 mm (24 feet) and 19200 mm (64 feet) locate expansion joint at center.
 - 3. At straight runs that exceed 9600 mm (32 feet) and form the leg of a corner locate the expansion joint not more than 4800 mm (16 feet) from the corner.

3.7 HANGING GUTTERS

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

3.8 CONDUCTORS (DOWNSPOUTS)

- A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.
- B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 13 mm (1/2 inch) movement for each 3000 mm (10 feet) of downspout.
- C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

3.9 GOOSENECK ROOF VENTILATORS

- A. Install on structural curb not less than 200 mm (8 inch) high above roof surface.
- B. Securely anchor ventilator curb to structural curb with fasteners spaced not over 300 mm (12 inch) on center.
- C. Anchor gooseneck to curb with screws having neoprene washers at 150 mm (6 inch) on center.

- - - E N D - - -

SECTION 07 61 16
STANDING SEAM METAL ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the installation of standing seam metal roofing.

1.2 RELATED WORK:

A. Sealant: Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Fabricator's qualifications.
- C. Installer qualifications.
- D. Manufacturers literature, data, for standing seam metal, underlayment, sealant and accessories.
- E. Submit shop and erection drawings containing data necessary to clearly describe design, materials, sizes, layouts, seam configuration, construction details, provisions for thermal movement, line of panels, fastener sizes and spacings, sealants and installation procedures. Show waterproof connections to adjoining work; show obstruction and penetration details.
- F. Samples consisting of 152 mm (6 inch) or 305 mm (12 inch) square specimens of specified metal roofing material.

1.4 WIND UPLIFT LOADS:

A. Provide roof assemblies meeting uplift pressures using a basic wind speed of 100 miles per hour, an importance factor of 1, and an exposure of class C.

1.5 QUALITY ASSURANCE:

- A. Fabricator's Qualifications: Company specializing in standing seam metal roofing work with three (3) years' experience in similar size and type of installations. Submit qualifications.
- B. Installer: A firm with three (3) years of successful experience with installation of standing seam metal roofing of type and scope equivalent to Work of this Section. Submit qualifications.

1.6 WARRANTY:

A. Special Warranty on Panel Finishes: manufacturer agrees 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 D 2244
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
 - c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion
- B. Special Watertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.
 1. Warranty Period: 10 years from date of substantial completion
 2. Shop drawings must be provided (or reviewed) by the panel manufacturer and approved by the panel manufacturer prior to the installation of the panel system.
 3. A minimum of two inspections by the technical representative of the panel system manufacturer are required. The first inspection is to be performed when the underlayment and flashing are in place and the second inspection is to be performed when the roof is complete.
- C. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator for a two year period from the date of substantial completion of the building guaranteeing materials and workmanship for watertightness of the roofing system, flashing, penetrations, and against all leaks.

1.7 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only:
- B. ASTM International (ASTM):
 - D1970/D1970M-14.....Self-Adhering Polymer Modified Bituminous Sheet
Materials Used as Steep Roofing Underlayment
for Ice Dam Protection
 - D2822/D2822M-05(R2011)..Asphalt Roofing Cement
 - F1667-13.....Driven Fasteners: Nails, Spikes and Staples
- C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual (Seventh Edition - 2012)

PART 2 - PRODUCTS

2.0 BASIS OF DESIGN: BERRIDGE CURVED TEE-PANEL

2.1 STANDING SEAM METAL ROOF PANELS:

- A. General: provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
- C. Nominal Thickness: 0.024 inch (0.61 mm)
- D. Exterior Finish: Two-coat fluoropolymer
- E. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling. Strippable (protective) film must be removed prior to panel installation.
- F. Color: See section 09 06 00 Schedule of Finishes.

2.2 FLASHING AND TRIM:

- A. Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

2.3 PANEL SEALANTS:

- A. Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.4 PANEL FASTENERS:

- A. Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements. Exposed fasteners, where approved by architect, shall be gasketed or have gasketed washers on the exterior side of the covering to waterproof the penetration.

2.5 UNDERLAYMENTS:

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
 - B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Roll laps with roller. Cover underlayment within 14 days.
1. Apply over the entire standing seam roof surface.

3.3 ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied vinyl weatherseal.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

- - - 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. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- B. Sealants and application: Section 07 92 00, JOINT SEALANTS.
- C. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS; Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS:

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

1.4 DELIVERY AND STORAGE:

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

1.5 QUALITY ASSURANCE:

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

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

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - E84-14.....Surface Burning Characteristics of Building Materials
 - E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
 - E814-13a.....Fire Tests of Through-Penetration Fire Stops
 - E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops
 - E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- C. FM Global (FM):
 - Annual Issue Approval Guide Building Materials
 - 4991-13.....Approval of Firestop Contractors
- D. Underwriters Laboratories, Inc. (UL):
 - Annual Issue Building Materials Directory
 - Annual Issue Fire Resistance Directory
 - 723-10(2008).....Standard for Test for Surface Burning Characteristics of Building Materials
 - 1479-04(R2014).....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):
Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

- A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 in.) nominal pipe or 0.01 sq. m (16 sq. in.) in overall cross sectional area.
- C. Firestop sealants used for firestopping or smoke sealing to have the following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Release no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
 - 5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- D. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:

1. Classified for use with the particular type of penetrating material used.
 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- E. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.
- F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- G. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.
- H. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 101 mm (4 in.) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS:

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

PART 3 - EXECUTION

3.1 EXAMINATION:

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

3.2 PREPARATION:

- A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.
- C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

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

3.4 CLEAN-UP:

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

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

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

- - - E N D - - -

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. Sealing of Site Work Concrete Paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- B. Masonry Control and Expansion Joint: Section 04 20 00, UNIT MASONRY.
- C. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.
- D. Glazed Aluminum Curtain Wall: Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.
- E. Sound Rated Gypsum Partitions/Sound Sealants: Section 09 29 00, GYPSUM BOARD.
- F. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION; Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING; Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

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.
- E. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections and to demonstrate aesthetic effects and qualities of materials and execution.

1.4 CERTIFICATION:

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

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Installer qualifications.
- C. Contractor certification.

- D. Manufacturer's installation instructions for each product used.
- E. Cured samples of exposed sealants for each color.
- F. Manufacturer's Literature and Data:
 - 1. Primers
 - 2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- G. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations:
 - 1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
 - b. When joint substrates are wet.
- B. Joint-Width Conditions:
 - 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:
 - 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

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

1.8 DEFINITIONS:

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

1.9 WARRANTY:

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

1.10 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material
 - C612-14.....Mineral Fiber Block and Board Thermal Insulation
 - C717-14a.....Standard Terminology of Building Seals and Sealants
 - C734-06 (R2012).....Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering
 - C794-10.....Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - C919-12.....Use of Sealants in Acoustical Applications.
 - C920-14a.....Elastomeric Joint Sealants.
 - C1021-08 (R2014).....Laboratories Engaged in Testing of Building Sealants
 - C1193-13.....Standard Guide for Use of Joint Sealants.
 - C1248-08 (R2012).....Test Method for Staining of Porous Substrate by Joint Sealants
 - C1330-02 (R2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
 - C1521-13.....Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
 - D217-10.....Test Methods for Cone Penetration of Lubricating Grease
 - D412-06a (R2013).....Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1056-14.....Specification for Flexible Cellular Materials-
Sponge or Expanded Rubber

E84-09.....Surface Burning Characteristics of Building
Materials

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

D. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. S-1 Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25
2. S-2 Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
 - a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
 - b. Metal to metal.
 - c. Masonry to masonry or stone.
 - d. Cast stone to cast stone.
 - e. Masonry expansion and control joints.
 - f. Masonry joints where shelf angles occur.
 - g. Voids where items penetrate exterior walls.
 - h. 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. S-3 Provide location(s) of floor joint sealant as follows.
 - a. Seats of metal thresholds exterior doors.
 - b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

C. Interior Sealants:

1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Architectural Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
2. S-4 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
3. S-5 Food Service: Use a Vinyl Acetate Homopolymer, or other low VOC, non-toxic sealant approved for use in food preparation areas.
4. Provide location(s) of interior sealant as follows:
 - a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.
 - b. Perimeter of doors, windows, access 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. Exposed isolation joints at top of full height walls.
 - f. Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; joints formed where nonplanar tile surfaces meet.
 - g. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.
 - h. 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 FILLER:

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

2.5 PRIMER:

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

2.6 CLEANERS-NON POROUS SURFACES:

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

- 1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
- 2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
- 3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
- 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
- 5. Avoid dropping or smearing compound on adjacent surfaces.
- 6. Fill joints solidly with compound and finish compound smooth.
- 7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
- 8. Finish paving or floor joints flush unless joint is otherwise detailed.
- 9. Apply compounds with nozzle size to fit joint width.
- 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
- 11. Replace sealant which is damaged during construction process.

C. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

- D. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
 4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
 5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for first 305 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 305 m (1000 feet) of joint length thereafter or one test per each floor per elevation.
 - B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
 - C. Inspect tested joints and report on following:
 1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.

2. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 3. Whether sealants filled joint cavities and are free from voids.
 4. Whether sealant dimensions and configurations comply with specified requirements.
- D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
- E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.7 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

- - - E N D - - -

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated floor, wall, and ceiling building expansion joint assemblies.
 - a. Elastomeric joint covers at wall and ceiling joints.
 - b. Exterior wall joints.

1.2 RELATED REQUIREMENTS

A. (NOT APPLICABLE)

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this Section.
- B. American Society of Civil Engineers (ASCE):
 1. ASCE/SEI 7-10 - Minimum Design Loads For Buildings and Other Structures.
- C. ASTM International (ASTM):
 1. B455-10 - Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.
 2. C864-05(2011) - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 3. E1399/E1399M-97(2013)e1 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
 4. E1966-15 - Standard Test Method for Fire-Resistive Joint Systems.
- D. UL LLC (UL):
 1. 2079-15 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this Section.
 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.
 - d. Manufacturer's field representative.
 - e. Other installers responsible for adjacent and intersecting work.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 1. Include large-scale details indicating profiles of each type of expansion joint cover, splice joints between joint sections, transitions to other assemblies, terminations, anchorages, fasteners, and relationship to adjoining work and finishes.
 2. Show size, configuration, and fabrication and installation details.
 3. Include composite drawings showing work specified in other Sections coordinated with expansion joints.
- C. Manufacturer's Literature and Data:
 1. Description of each product specified.
 2. Show movement capability of each cover assembly and suitability of material used in exterior seals for ultraviolet exposure.
 3. Description of materials and finishes.
 4. Installation instructions.
- D. Samples: Submit 300 mm (12 inch) long samples.
 1. Each type and color of metal finish for each required thickness and alloy.
 2. Each type and color of flexible seal.
- E. Qualifications: Substantiate qualifications comply with specifications.
 1. Installer with project experience list.
- F. Certificates: Indicate products comply with specifications.
 1. Fire rated expansion joint cover assemblies.
- G. Operation and Maintenance Data:
 1. Care instructions for each exposed finish product.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.

1.7 DELIVERY

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

1.8 STORAGE AND HANDLING

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

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting expansion joint cover assembly fabrication and installation. Show field measurements on Submittal Drawings.
 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.10 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Provide joint cover assemblies that permit unrestrained movement of joint without disengagement of cover, and, where applicable, maintain moisture, watertight and fire-rated protection.
- B. Provide templates to related trades for location of support and anchorage items.

2.2 SYSTEM PERFORMANCE

- A. Design expansion joint cover assemblies complying with specified performance.
- B. To be implemented at connection of Building #1 and the Pedestrian Walkway of Building #54.

C. Basis of Design:

1. Vertical Expansion Joints: EMSEAL Emshield SecuritySeal SSW2
2. Horizontal Expansion Joints: EMSEAL Emshield SecuritySeal SSW2

D. Fire Rated Joints: ASTM E1399, ASTM E1966, or UL 2079, including hose stream test at full-rated period.

1. Fire rating: Match adjacent floor, wall, and ceiling construction.
2. System: Capable of anticipated movement while maintaining fire rating.
3. Coverless Applications: Maintain fire rating without joint cover system.

2.3 MATERIALS

A. Elastomeric Sealant: As specified in Section 07 92 00, JOINT SEALANTS.

B. Elastomeric Seals:

1. Flexible extruded polyvinyl chloride, meeting a Shore A hardness of 75 with UV stabilizer. Manufacturer's standard colors.

C. Thermoplastic Rubber:

1. ASTM C864.
2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.

D. Compression Seals: Pre-compressed secondary sealant using preformed expanding foam sealant; open-cell polyurethane foam impregnated with polymer-modified acrylic adhesive.

E. Water Barrier Sheets: Neoprene or EPDM flexible sheet materials minimum 45 mils thick.

1. Provide with drain tubes for horizontal applications.

F. Vinyl Invertor Sealant Waterstops: Manufacturer's standard shapes and grade.

G. Moisture Barrier: Fabric reinforced clear vinyl sheet material sized to accommodate opening.

H. Flexible Membrane: 1.5 mm (60 mil) EPDM sheet, with manufacturer's standard support foam.

I. Fire Barrier: Labeled by an approved independent testing laboratory for fire resistance rating indicated for maximum joint width.

- a. Thermal Insulation: Manufacturer's standard with factory cut miters and transitions.

- b. Fire Barrier Lengths:

- 1) Joint widths up to and including 150 mm (6 inches): Maximum 15 m (50 feet) to minimize field splicing.

2) Other Joint widths: 3 m (10 foot) with overlapping ends for field splicing.

- J. Ceramic Blanket: Manufacturer's standard joint filler to achieve fire rating indicated.
- K. Butyl Caulk Tape: Self adhering double sided butyl rubber sealant tape with easy-release silicone coated paper.

2.4 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer.
 - 1. Provide ceiling and wall expansion joint cover assemblies design matching floor to wall and floor to floor expansion joint cover design.
 - 2. Provide expansion joint cover assembly designs, profiles, materials and configuration indicated, as required to accommodate joint size variations in adjacent surfaces, and anticipated movement.

2.5 FABRICATION

- A. Fabricate Expansion Joint Cover Assemblies:
 - 1. As complete assembly ready for installation.
 - 2. In longest practicable lengths to minimize number of end joints.
 - 3. With factory mitered corners where joint changes directions or abuts other materials.
 - a. With closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
 - 4. Where floor slab is fire rated provide ceramic blanket at joints.
 - 5. Seal Strip: Factory-formed and bonded to metal frames and anchor members.
 - 6. Compression Seals: Fabricate from expanding foam as secondary seal and elastomeric sealant to sizes and profiles shown.
- B. Exterior Wall Joint Assemblies:
 - 1. Design seal for variable movement and prevention of water and air infiltration.
 - 2. Frame: Metal, concealed, for fastening to wall on one side of joint.
 - 3. Cover Plate: Metal, surface mounted, lap both sides of joint, permitting free movement on one side.
 - a. Fabricate with concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
 - b. Use angle cover plate at intersecting walls.
 - 4. Water Seal: Vinyl seal strip as secondary seal behind primary seal.
 - 5. Seismic: As required by Code.
 - 6. Finish: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.

- C. Preformed Sealant Joint: Factory installed elastomeric sealant between extruded aluminum angle frame both sides.
 - 1. Frames: Extruded aluminum angle on both sides of joint.
 - 2. Filler: Elastomeric sealant.
 - 3. Anticipated movement: 25 percent maximum.
 - 4. Finishes: to be selected by architect from manufacturer's full range.

2.6 ACCESSORIES

- A. General: Manufacturer's standard anchors, fasteners, set screws, spaces, protective coating, and filler materials, adhesive and other accessories required for installation.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.
- D. Fasteners: Type and size recommended by expansion joint cover assembly manufacturer.
 - 1. Exterior Applications: Stainless steel.
 - 2. Fasteners for Aluminum: Stainless steel.
 - 3. Other Applications: Galvanized steel or stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Provide items embedded in concrete and masonry in time for building into work without delaying work.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install anchorage devices and fasteners for securing expansion joint assemblies to in-place construction where anchors are not embedded in concrete and masonry.
 - 1. Secure with metal fasteners, type and size to suit application.
- C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.

- D. Install joint cover assemblies aligned and positioned in correct relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.
 - 1. Allow for thermal expansion and contraction of metal to avoid buckling.
 - 2. Accommodate joint opening size at time of installation.
- E. Set floor covers at elevations flush with adjacent finished flooring, unless shown otherwise.
- F. Grout floor frames set in prepared recesses.
- G. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Secure with required accessories.
- H. Locate anchors at interval recommended by manufacturer, but minimum 75 mm (3 inches) from each end, and, maximum 600 mm (24 inches) on centers.
- I. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.
- J. Cut and fit ends to accommodate thermal expansion and contraction of metal to avoid buckling of frames and cover plates.
- K. Flush Metal Cover Plates:
 - 1. Secure flexible filler between frames to allow compression and expansion.
 - 2. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- L. Waterstops:
 - 1. Install in conjunction with floor joints, and where shown.
 - 2. Install continuously to prevent water damage to finish spaces.
 - 3. Seal waterstop to frames to prevent water leakage.
 - 4. Install drainage tubes from waterstops to discharge collected water in nearest plumbing air gap drain.
- M. Fire Barriers:
 - 1. Install in compliance with tested assembly.
 - 2. Install at joints in floors and in fire rated walls.
 - 3. Use fire barrier sealant furnished with expansion joint assembly.
- N. Apply sealant where required to prevent water and air infiltration.

- O. Vertical Exterior Extruded Thermoplastic Rubber.
 - 1. Install side frames mounted on sealant or butyl caulk tape with appropriate anchors 600 mm (24 inches) on center complete with secondary seal.
 - 2. Install primary seals retained in extruded aluminum side frames.
- P. Extruded Thermoplastic Rubber or Seals:
 - 1. For straight sections, install preformed seals in continuous lengths.
 - 2. Vulcanize or heat-seal field spliced joints to provide watertight joints as recommended by manufacturer.
- Q. Preformed Elastomeric Sealant Joint:
 - 1. Locate joint directly over joints in wall and floor substrates.
 - 2. Fasten full length to substrate using construction adhesive.
 - 3. Install flush or slightly below finish material.

3.3 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed metal surfaces. Remove contaminants and stains.

3.4 PROTECTION

- A. Cover floor joints with plywood where wheel traffic occurs before Substantial completion.
- B. Remove protective covering when adjacent work areas are completed. Clean exposed surfaces in compliance with manufacture's printed instructions.

- - E N D - -

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow metal doors and 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 REQUIREMENTS

- A. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Glazing: Section 08 80 00, GLAZING.
- D. 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):
 1. A250.8-2014 - Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
 1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 2. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip.
 3. 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.
 4. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 5. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 6. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 7. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 8. D3656/D3656M-13 - Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns.
 9. E90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

- D. Federal Specifications (Fed. Spec.):
 - 1. L-S-125B - Screening, Insect, Nonmetallic.
- E. Master Painters Institute (MPI):
 - 1. No. 18 - Primer, Zinc Rich, Organic.
- F. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. AMP 500-06 - Metal Finishes Manual.
- G. National Fire Protection Association (NFPA):
 - 1. 80-16 - Fire Doors and Other Opening Protectives.
- H. UL LLC (UL):
 - 1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
 - 2. 1784-15 - Air Leakage Tests of Door Assemblies and Other Opening Protectives.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Include schedule showing each door and frame requirements 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 each product complies with specifications.
 - 1. Sound rated door.
- F. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Regularly manufactures specified products.
 - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.

1.6 DELIVERY

- A. Fasten temporary steel spreaders across the bottom of each door frame before shipment.
- B. Deliver products in manufacturer's original sealed packaging.
- C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design hollow metal doors and frames complying with specified performance:
 - 1. Fire Doors and Frames: UL 10C; NFPA 80 labeled.
 - a. Fire Ratings: See drawings.
 - 2. Smoke Control Doors and Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cu. m/s/sq. m (3.0 cfm/sf) at 24.9 Pa (0.10 inches water gage) pressure differential.
 - 3. Sound Rated Doors and Frames: Minimum 45 sound transmission class (STC) when tested according to ASTM E90.
 - 4. Thermal Transmittance: 0.38 U-value maximum at exterior doors.
 - 5. Thermal Resistance: 2.65 R-value, minimum at exterior doors.
 - 6. Blast Resistance: According to all provisions set forth in the Physical Security and Resiliency Design Manual, dated October 1, 2020, issued by the Department of Veterans Affairs, Office of Construction and Facilities Management.

2.2 MATERIALS

- A. Sheet Steel: ASTM A1008/A1008M, cold-rolled.
- B. Aluminum Sheet: ASTM B209M (ASTM B209).
- C. Aluminum Extrusions: ASTM B221M (ASTM B221).

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide hollow metal doors and frames from one manufacturer.
- C. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 2. Stainless Steel Recycled Content: 70 percent total recycled content, minimum.
 - 3. Aluminum Recycled Content: 50 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 3 and Physical Performance Level A, extra-heavy duty; Model 2, seamless at all locations.
- B. Door Faces:
 - 1. Interior Doors: Sheet steel
 - 2. Exterior Doors: Expanded Polyurethane Core
 - a. Face construction to be modified accordingly to resist blasts; see Section 2.1.
 - b. 14 gauge face thickness, minimum.
- C. Door Cores:
 - 1. Interior Doors: Kraft paper honeycomb
 - 2. Fire Doors: Manufacturer's standard complying with specified fire rating performance.
 - 3. Exterior Doors: Expanded Polyurethane Core
 - a. Core construction to be modified accordingly to resist blasts; see Section 2.1.

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 3 Hollow Metal Doors: 1.3 mm (0.053 inch) thick.
 - b. Wood Doors: 1.3 mm (0.053 inch) thick.
- B. Frame Materials:
 - 1. Interior Frames: Sheet steel.
 - 2. Exterior Frames: Galvanized or Galvannealed sheet steel minimum Z120 or ZF120 (G40 or A40)
 - a. Frame construction to be modified accordingly to resist blasts; see Section 2.1.

b. 14 gauge face thickness, minimum.

2.6 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. 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.
- E. Hollow Metal Frame Fabrication:
 - 1. Fasten mortar guards to back of hardware reinforcements, except on lead-lined frames.
 - 2. 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 (2 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.
- 9) Anchorage to be modified accordingly to resist blasts; see Section 2.1.

F. Sound Rated Door Frames:

- 1. Seals: Integral continuous gaskets on frames.

2.7 FINISHES

- A. Steel ANSI A250.8; shop primed.

- B. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.
 - 1. Blend welds to match adjacent finish.
- C. Finish exposed surfaces after fabrication.

2.8 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. Frame Insulation: Closed-Cell Spray Foam Insulation, to fill all voids within frames.

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.
 - d. Anchorage to be modified accordingly to resist blasts; see Section 2.1.

E. Frames for Sound Rated Doors: Fill frames with insulation.

F. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.
2. Repair painted surfaces with touch up primer.

G. Insulation: Fill all exterior door frames with closed-cell spray foam insulation. Insulation to be entirely encapsulated by frame, sealants, and surrounding construction.

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.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior flush wood doors transparent finish.
 - a. Fire rated doors.
 - b. Smoke rated doors.
 - c. Acoustical doors.
2. Interior stile and rail wood doors transparent finish.

1.2 RELATED REQUIREMENTS

- A. Paints and Coatings and Composite Wood and Agrifiber VOC Limits:
Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Door Hardware including hardware location (height): Section 08 71 00,
DOOR HARDWARE.
- C. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL
DOORS AND FRAMES, Section 08 71 00, DOOR HARDWARE.
- D. Door Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Window and Door Manufacturers
Association (ANSI/WDMA):
 1. I.S. 1A-13 - Architectural Wood Flush Doors.
 2. I.S. 6A-13 - Interior Architectural Stile and Rails Doors.
- C. ASTM International (ASTM):
 1. E90-09 - Laboratory Measurements of Airborne Sound Transmission Loss
of Building Partitions and Elements.
- D. National Fire Protection Association (NFPA):
 1. 80-16 - Fire Doors and Other Opening Protectives.
 2. 252-12 - Fire Tests of Door Assemblies.
- E. UL LLC (UL):
 1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
- F. Window and Door Manufacturers Association (WDMA):
 1. TM 7-14 - Cycle-Slam Test.
 2. TM 8-14 - Hinge Loading Test.
 3. TM 10-14 - Screw Holding Capacity.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Include details of glazing.
 - 3. Indicate project specific requirements not included in Manufacturer's Literature and Data submittal.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Fire rated doors showing conformance with NFPA 80.
- D. Samples:
 - 1. Corner section of flush veneered door 300 mm (12 inches) square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
 - 2. Veneer sample 200 mm by 275 mm (8 inch by 11 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.
- E. Sustainable Construction Submittals:
 - 1. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- F. Test Reports: Indicate each product complies with specifications.
 - 1. Screw Holding Capacity Test.
 - 2. Cycle-Slam Test.
 - 3. Hinge-Loading Test.
- G. Operation and Maintenance Data:
 - 1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Regularly and presently manufactures specified products.
 - 2. Manufactures specified products with satisfactory service on five similar installations for minimum five years.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
 - 1. Minimum 0.15 mm (6 mil) polyethylene bags or cardboard packaging to remain unbroken during delivery and storage.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, and manufacture date.

1. Identify door opening corresponding to Door Schedule.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight conditioned facility.

1. Store doors according to ANSI/WDMA I.S. 1A.

B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Environment:

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.

2. Work Area Ambient Temperature Range: 21 to 27 degrees C (70 to 80 degrees F) continuously, beginning 48 hours before installation.

3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

a. Comply with door manufacturer's instructions for relative humidity.

1.9 WARRANTY

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

B. Manufacturer's Warranty: Warrant interior factory finished flush and stile and rail wood doors against material and manufacturing defects.

1. Warranty Period: Lifetime of original installation.

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide each product from one manufacturer.

C. Sustainable Construction Requirements:

1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:

a. Paints and coatings.

b. Composite wood and agrifiber.

2.2 FLUSH WOOD DOORS

- A. Basis of Design: Marshfield Aspiro Series
- B. General:
 - 1. ANSI/WDMA I.S. 1A, Extra Heavy Duty.
 - 2. Adhesive: Type II.
 - 3. Core: Extra heavy-duty (EHD) particleboard with fire-rated options.
 - 4. Thickness: 44 mm (1-3/4 inches) unless otherwise shown or specified.
- C. Panels:
 - 1. ANSI/WDMA I.S. 1A.
 - 2. High-Impact Rating.
 - 3. One laminate throughout project unless scheduled or otherwise shown.
 - 4. Transparent Finished Faces: Choice Laminates, to be selected by architect from manufacturer's full range of species.
 - a. Match face veneers for doors for uniform effect of color and grain at joints.
 - b. Door Edges: Veneer Edge
 - 5. Factory sand doors for finishing.
- D. Wood For Stops, Louvers, Muntins and Moldings For Flush Doors Required to Have Transparent Finish:
 - 1. Solid wood of same species as face veneer, except maple is acceptable on birch doors.
 - 2. Glazing:
 - a. On non-fire-rated doors, use applied wood stops nailed tightly on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on center.
- E. Stiles and Rails:
 - 1. Composite material having screw withdrawal force greater than minimum performance level value when tested according to WDMA TM 10.
 - 2. Provide adequate blocking for bottom of doors having mechanically operated door bottom seal meeting or exceeding performance duty level per WDMA TM 10 for horizontal door edge screw holding.
- F. Fire-Rated Wood Doors:
 - 1. Fire Resistance Rating:
 - a. B Label: 1-1/2 hours.
 - b. C Label: 3/4 hour.
 - 2. Labels:

- a. Comply with NFPA 252, UL 10C, and labeled by qualified testing and inspection agency showing fire resistance rating.
- b. Metal labels with raised or incised markings.
3. Performance Criteria for Stiles of Doors Utilizing Standard Mortise Leaf Hinges:
 - a. Hinge Loading: WDMA TM 8. Average of 10 test samples for Extra Heavy Duty doors.
 - b. Direct Screw Withdrawal: WDMA TM 10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
 - c. Cycle-Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested according to WDMA TM 7.
4. Hardware Reinforcement:
 - a. Provide fire and smoke rated doors with hardware reinforcement blocking.
 - b. Size of lock blocks as required to secure hardware specified.
 - c. Top, Bottom and Intermediate Rail Blocks: Minimum 125 mm (5 inches) by full core width.
 - d. Reinforcement blocking in compliance with labeling requirements.
 - e. Mineral material similar to core is not acceptable.
5. Other Core Components: Manufacturer's standard as allowed by labeling requirements.
6. Glazed Vision Panel Frame: Steel approved for use in labeled doors.
- G. Smoke Barrier Doors:
 1. Glazed Vision Panel Frame: Steel approved for use in labeled doors.
- H. Sound Rated Doors:
 1. Fabricated as specified for flush wood doors with additional construction requirements to comply with specified sound transmission class (STC).
 2. STC Rating of door assembly in place when tested according to ASTM E90 by independent acoustical testing laboratory minimum 35
 3. Accessories:
 - a. Frame Gaskets and Automatic Door Bottom Seal: as required by manufacturer to achieve required STC rating.

2.3 FABRICATION

- A. Factory machine interior wood doors to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

1. Factory fit fire rated doors according to NFPA 80.
- B. Rout doors for hardware using templates and location heights specified in Section 08 71 00, DOOR HARDWARE.
- C. Factory fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (2 inches) of door thickness, undercut where shown.
- D. Clearances between Doors and Frames and Floors:
 1. Fire Rated Doors: Comply with NFPA 80.
 - a. Doors with Automatic Bottom Seal: Maximum clearance 10 mm (3/8 inch) at threshold.
 - b. Other Door Bottoms: Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
 2. Door Jambs, Heads, and Meeting Stiles: Maximum 3 mm (1/8 inch).
- E. Provide cutouts for glazed openings.
- F. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.
- G. Identify each door on top edge.
 1. Mark with stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, date of manufacture and quality.
 2. Mark door or provide separate certification including name of inspection organization.
 3. Identify door manufacturing standard, including glue type.
 4. Identify veneer and quality certification.
 5. Identification of preservative treatment for stile and rail doors.

2.4 FINISHES

- A. Field Finished Doors: Seal top and bottom edges of doors with two coats of catalyzed polyurethane or water resistant sealer.
- B. Factory Transparent Finish:
 1. Factory finish flush and stile and rail wood doors.
 - a. ANSI/WDMA I.S. 1A Section F-3 Finish System Descriptions for System 5, Conversion Varnish or System 7, Catalyzed Vinyl.
 - b. Use stain when required to produce finish specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.

1. Verify door frames are properly anchored.
 2. Verify door frames are plumb, square, in plane, and within tolerances for door installation.
- B. Protect existing construction and completed work from damage.
- C. Install astragal on active leaf of pair of smoke doors and one leaf of double egress smoke doors.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
1. Install fire rated doors according to NFPA 80.
 2. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 PROTECTION

- A. After installation, place shipping container over door and tape in place.
1. Do not apply tape to door faces and edges.
- B. Provide protective covering over exposed hardware in addition to covering door.
- C. Maintain covering in good condition until removal is directed by Contracting Officer's Representative.

- - E N D - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies access doors.

1.2 RELATED WORK:

- A. Wire mesh and screen access doors: Section 05 50 00, METAL FABRICATIONS.
- B. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.
- C. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.
- D. Locations of access doors for duct work cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Access doors, each type, showing construction, location and installation details.
- C. Manufacturer's Literature and Data: Access doors, each type.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A167-99(R-2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 - A1008-10.....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy
- C. American Welding Society (AWS):
 - D1.3-08.....Structural Welding Code Sheet Steel
- D. National Fire Protection Association (NFPA):
 - 80-10.....Fire Doors and Windows
- E. The National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 Series.....Metal Finishes Manual
- F. Underwriters Laboratories, Inc. (UL):
 - Fire Resistance Directory

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

- A. Fabricate components to be straight, square, flat and in same plane where required.
 - 1. Slightly round exposed edges and without burrs, snags and sharp edges.
 - 2. Exposed welds continuous and ground smooth.
 - 3. Weld in accordance with AWS D1.3.
- B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.
- C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

2.2 ACCESS DOORS, FIRE RATED:

- A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120 degree C (250 degrees F).
- B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.
- C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel sheet, insulated sandwich type construction.
- D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.
 - 1. Weld exposed joints in flange and grind smooth.
 - 2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.
- E. Automatic Closing Device: Provide automatic closing device for door.
- F. Hinge: Continuous steel hinge with stainless steel pin.
- G. Lock:
 - 1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
 - 2. Provide latch release device operable from inside of door. Mortise case in door.

2.3 ACCESS DOORS, FLUSH PANEL:

A. Door Panel:

1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
2. Reinforce to maintain flat surface.

B. Frame:

1. Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed.
2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
3. Weld exposed joints in flange and grind smooth.

C. Hinge:

1. Concealed spring hinge to allow panel to open 175 degrees.
2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:

1. Flush, screwdriver operated cam lock.

2.4 FINISH:

- A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.
- B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

2.5 SIZE:

- A. Provide largest size available, rectangular in ratio with long axis vertical, that complies with the manufacturer's standards for maintaining the required rating.

PART 3 - EXECUTION

3.1 LOCATION:

- A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition, or are above ceiling of gypsum board or plaster.
- B. Use fire rated doors in fire rated partitions and ceilings.
- C. Use flush panels in partitions and gypsum board or plaster ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

3.2 INSTALLATION, GENERAL:

- A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.

- B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.
- C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.
- D. Set recessed panel access doors recessed so that face of surrounding materials will finish on the same plane, when finish in door is installed.

3.3 ANCHORAGE:

- A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.
- B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.
- C. Anchors for fire rated access doors shall meet requirements of applicable fire test.

3.4 ADJUSTMENT:

- A. Adjust hardware so that door panel will open freely.
- B. Adjust door when closed so door panel is centered in the frame.

- - - E N D - - -

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed entrances.

1.2 RELATED REQUIREMENTS

- A. Door Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Glass and Glazing: Section 08 80 00, GLAZING.
- C. Hardware: Section 08 71 00, DOOR HARDWARE.
- D. Automatic Door Actuators: Section 08 71 13, AUTOMATIC DOOR OPERATORS.
- E. Aluminum Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Architectural Manufacturers Associations (AAMA):
 - 2603-15.....Performance Requirements and Test Procedures
for Pigmented Organic Coatings on Aluminum
Extrusions and Panels
 - 2604-13.....Performance Requirements and Test Procedures or
High Performance Organic Coatings on
Architectural Extrusions and Panels
 - 2605-13.....Performance Requirements and Test Procedures
for Superior Performing Organic Coatings on
Aluminum Extrusions and Panels
- C. American Welding Society (AWS):
 - D1.2/D1.2M-14.....Structural Welding Code - Aluminum
- D. ASTM International (ASTM):
 - A240/A240M-20.....Chromium and Chromium-Nickel Stainless Steel
Plate, Sheet, and Strip for Pressure Vessels
and for General Applications
 - 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)

- D1187/D1187M-97(2018)...Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- E283/E283M-19.....Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- E330/E330M-14.....Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- E331-00(2016).....Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E1886-19.....Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missiles and Exposed to Cyclic Pressure Differentials
- E1996-17.....Performance of Exterior Windows, Curtain Walls, Doors, and impact Protective Systems Impacted by Windborne Debris in Hurricanes
- F468-16.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
- F593-17.....Stainless Steel Bolts, Hex Cap Screws, and Studs
- E. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual
- F. National Fenestration Rating Council (NFRC):
500-14(E1A0).....Determining Fenestration Product Condensation Resistance Values
- G. Department of Veterans Affairs (VA):
1. VA Physical Security and Resiliency Design Manual October 1, 2020

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. Architect/Engineer.
 - c. Contractor.
 - d. Installer.
 - e. Manufacturer's field representative.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings: Minimum 1 to 2 (half size) scale.
 1. Show size, configuration, and fabrication and installation details.
 2. Show anchorage and reinforcement.
 3. Show interface and relationship to adjacent work, including thermal, air, and water barrier continuity.
- C. Manufacturer's Literature and Data:
 1. Description of each product.
 2. Doors, each type.
 3. Entrance and Storefront construction.
 4. Installation instructions.
 5. Warranty.
- D. Samples:
 1. Door Corner Section: Minimum 450 mm x 450 mm (18 x 18 inches) for each specified door type, showing head rail and hinge stile, door closer reinforcement, internal reinforcement and insulation in flush panel door.
 2. Aluminum Anodized Finish: wo sample extrusions minimum 150 mm (6 inches) long for each specified color in sets of three showing maximum color range.
- E. Test reports: Certify each product complies products comply with specifications.

- F. Certificates: Certify each product complies products comply with specifications.
 - 1. Certify anodized finish thickness.
- G. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.
 - 2. Installer with project experience list.
 - 3. Welders and welding procedures.
- H. Delegated Design Drawings and Calculations: Signed and sealed by responsible design professional.
 - 1. Show location and magnitude of loads applied to building structural frame.
 - 2. Identify deviations from details shown on drawings.
 - 3. Blast Design Calculations
 - a. Submit calculations for review and approval prepared by qualified blast consultant, with a minimum of 5 years of experience in design of blast resistant window systems, verifying storefront assembly including anchors comply with specified blast resistance performance. The magnitudes of the design threats W1, W2 and GP1, GP2 are defined in the Physical Security and Resiliency Design Standards Data Definitions which is a document separate from the referenced VA Security and Resiliency Design Manual. The Physical Security and Resiliency Design Standards Data Definitions are provided on a need to know basis by the structural engineer blast specialist performing the blast design on VA projects. It is the responsibility of the delegated engineer responsible for the design of blast resistant entrances and storefronts to request and obtain the Physical Security and Resiliency Design Data Standard Data Definitions from the VA Office of Construction and Facilities Management (CFM). Any associated delays or increased costs due to failure to obtain this information will be borne by the contractor.
- I. 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.

a. Project Experience List: Provide contact names and addresses for completed projects.

B. Installer Qualifications: Product manufacturer and Manufacturer authorized representative.

1. Regularly installs specified products.

2. Installed specified products with satisfactory service on five similar installations for minimum five years.

a. Project Experience List: Provide contact names and addresses for completed projects.

C. Welders and Welding Procedures Qualifications: AWS D1.2/D1.2M.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

D. Store products indoors in dry, weathertight facility.

E. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

B. Manufacturer's Warranty: Warrant painted finish against material and manufacturing defects.

1. Warranty Period: 20 years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.

1. Minor deviations to details shown on drawings to accommodate manufacturer's standard products may be accepted by Contracting Officer's Representative when deviations do not affect design concept and specified performance.

- B. Design aluminum framed entrances and storefronts complying with specified performance:
1. Wind Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings when tested according to ASTM E330/E330M.
Wind Load: 38.6 psf positive and negative, minimum.
 - b. Maximum Deflection: 1/175 of span, maximum with minimum 1.65 safety factor.
 2. Thermal Movement: Accommodate ambient temperature range of 67 degrees C (120 degrees Fahrenheit).
 3. Blast Resistance:
 - a. Life Safety Protected Facilities: W1 design threat level located at standoff distance not to exceed pressures and impulses associated with GP1.
 - 1) Standoff Distance: 25 feet.
 - 2) Mullion deformation not to exceed deformation limits shown in Table 6-4 of the referenced Physical Security and Resiliency Design Manual.
 - 3) Glass shall be restrained within the mullions with ½" bite and minimum of 3/8" wide continuous bead of structural silicone adhesive attaching the inner lite of the glass to the frame
 4. Windborne-Debris Impact Resistance: Pass ASTM E1886.
 - a. Openings within 9144 mm (30 feet) of Grade: ASTM E1996 large missile test.
 - b. Other Openings: ASTM 1996 small missile test.
 5. Condensation Resistance: NFRC 500.
 - a. Fixed Framing: 66 CRF, minimum.
 6. Water Resistance: ASTM E331; No uncontrolled penetration at 380 Pa (8 pounds/square foot), minimum, pressure differential.
 7. Fixed Framing Air Infiltration Resistance: ASTM E283; 0.30 liter/second/square meter (0.06 cubic foot/minute/square foot), maximum at 300 Pa (6.24 pounds/square foot), minimum, pressure differential.
 8. Entrance Doors Air Infiltration Resistance: ASTM E283; maximum allowable at 75 Pa (1.57 pounds/square foot), minimum, pressure differential.
 - a. Single Doors: 2.5 liter/second/square meter (0.5 cubic foot/minute/square foot).

- b. Paired Doors: 6 liter/second/square meter (1.2 cubic foot/minute/square foot).

2.2 MATERIALS

A. Aluminum:

1. Sheet Metal: ASTM B209M (ASTM B209), minimum 1.6 mm (0.063 inch) thick.
2. Extrusions: ASTM B221M (ASTM B221).
 - a. Framing: Minimum 3 mm (0.125 inch) wall thickness.
 - b. Glazing Beads, Moldings, and Trim: Minimum 1.25 mm (0.050 inch) thick.
3. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights storefronts and transoms.
4. Alloy 6061 temper T6 for guide tracks for sliding doors and other extruded structural members.
 - a. Color Anodized Aluminum: Provide aluminum alloy required to produce specified color.

B. Stainless Steel: ASTM A240/A240M; Type 302 or Type 304.

C. Thermal Break: Manufacturer standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.

2.3 PRODUCTS - GENERAL

A. Basis of Design:

1. Product: RELIANCE MSD-375 BlastMax Doors by Oldcastle Building Envelope.
2. Dark Bronze Anodized Aluminum Finish. See Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide aluminum framed entrances and storefronts from one manufacturer and from one production run.

C. Provide aluminum entrances and curtain wall systems from same manufacturer.

2.4 FRAMES

A. Framing Members: See 08 44 13 GLAZED CURTAIN WALLS.

B. Stops: Provide integral fixed stops and glass rebates and snap-on removable stops.

C. Provide concealed screws, bolts and other fasteners.

D. Secure cover boxes to frames in back of lock strike cutouts.

2.5 STILE AND RAIL DOORS

A. Stiles and Rails: Extruded aluminum, thermally broken.

1. Thickness: 1-3/4 inches.

2. Stiles: 4-3/4 inches wide, minimum.
 3. Head Rails: 4 inches wide, minimum.
 4. Bottom Rails: 9 inches wide, minimum.
- B. Single-Acting Doors:
1. Bevel: 3 mm (1/8 inch) at lock, hinge, and meeting stile edges.
 2. Clearances: 2 mm (1/16 inch) at hinge stiles, 3 mm (1/8 inch) at lock stiles and top rails, and 5 mm (3/16 inch) at floors and thresholds.
- C. Glass Rebates: Integral with stiles and rails.
- D. Glazing Beads: Extruded aluminum, 1.3 mm (0.050 inch) thick. Integral with stiles and rails or applied type, snap-fit secured.
- E. Stile and Rail Joints: Welded or interlocking dovetail joints between stiles and rails.
1. Clamp door together through top and bottom rails with 9 mm (3/8 inch) primed steel tie rod extending into stiles, and having self-locking nut and washer at both ends.
 2. Reinforce stiles and rails to prevent door distortion when tie rods are tightened.
 3. Provide compensating spring-type washer under each nut for stress relief.
 4. Construct joints to remain rigid and tight when door is operated.
- F. Weather-stripping: Removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder.
1. Make slots for applying weather-stripping integral with doors and door frame stops.
 2. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames so doors swing freely and close positively.

2.6 FLUSH PANEL DOORS

- A. Frames: Aluminum extrusions.
- B. Doors: 45 mm (1-3/4 inches) thick.
1. Door Edges and Internal Reinforcing: Extruded aluminum tubes, single piece full height and width, welded joints.
 2. Core: Manufacturer's standard non-combustible insulation.
 3. Faces: Aluminum sheet metal with internal impact reinforcement,

3.1 laminated to the door edges and core.

- A.

2.7 FABRICATION

- A. Form metal parts and fit and assemble joints, except joints designed to accommodate movement. Seal joints to resist air infiltration and water penetration.
- B. Welding:
 - 1. Make welds without distorting and discoloring exposed surfaces.
 - 2. Clean and dress welds. Remove welding flux and weld spatter.
- C. Prepare and reinforce doors and frames for hardware and accessories.
 - 1. Coordinate preparation with specified hardware. See Section 08 71 00, DOOR HARDWARE.
 - 2. Fabricate reinforcement from stainless steel plates.
 - a. Hinge and pivot reinforcing: Minimum 4.5 mm (0.179 inch) thick.
 - b. Lock Face, Flush Bolts, Concealed Holders, Concealed and Surface Mounted Closers Reinforcing: Minimum 2.6 mm (0.104 inch) thick.
 - c. Other Surface Mounted Hardware Reinforcing: Minimum 1.5 mm (0.059 inch) thick.
 - 3. Where concealed hardware is specified, provide space, cutouts, and reinforcement for installation and secure fastening.
- D. Factory assembled doors.

2.8 FINISHES

- A. Dark Bronze Anodized Finish: NAAMM AMP 500.
 - 1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.

2.9 ACCESSORIES

- A. Dielectric Tape: Plastic, non-absorptive, with pressure sensitive adhesive; 0.18 to 0.25 mm (7 to 10 mils) thick.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Welding Materials: AWS D1.2/D1.2M, type to suit application.
- D. Fasteners:
 - 1. Aluminum: ASTM F468, Alloy 2024.
 - 2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.
- E. Anchors: Aluminum or stainless steel; type to suit application.
- F. Galvanizing Repair Paint: MPI No. 18.
- G. Touch-Up Paint: Match shop finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Coordinate floor closer installation recessed into concrete slabs.

2. Coordinate anchor installation built into masonry and concrete.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Apply dielectric tape or barrier coating to aluminum surfaces in contact with dissimilar metals and 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.
- B. Install aluminum framed entrances and storefronts plumb and true, in alignment and to lines shown on drawings.
- C. Anchor frames to adjoining construction at heads, jambs and sills.
- D. Provide concealed aluminum clips to connect adjoining frame sections.
- E. Install door hardware and hang doors. See Section 08 71 00, DOOR HARDWARE.
- F. Install door operators. See Section 08 71 13, AUTOMATIC DOOR OPERATORS.
- G. Adjust doors and hardware uniform clearances and proper operation.
- H. Touch up damaged factory finishes.
 1. Repair galvanized surfaces with galvanized repair paint.
 2. Repair painted surfaces with touch up primer.
- I. Tolerances:
 1. Variation from Plumb, Level, Warp, and Bow: Maximum 3 mm in 3 meters (1/8 inch in 10 feet).
 2. Variation from Plane: Maximum 3 mm in 3.65 meters (1/8 inch in 12 feet); 6 mm (1/4 inch) over total length.
 3. Variation from Alignment: Maximum 1.5 mm (1/16 inch) in-line offset and maximum 3 mm (1/8 inch) corner offset.
 4. Variation from Square: Maximum 3 mm (1/8 inch) diagonal measurement differential.

3.3 PROTECTION, CLEANING AND REPAIRING

- 3.1A.** Clean exposed aluminum and glass surfaces. Remove contaminants and
 - A. stains.

- B. Protect aluminum-framed entrances and storefronts from construction operations.
- C. Remove protective materials immediately before acceptance.
- D. Repair damage.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies glazed aluminum curtain wall system.
 - 1. Thermally isolated, pressure equalized on interior.
 - 2. Type: Stick system to include following:
 - a. Glass.
 - b. Integral reinforcing.
 - c. Closures, trim, subsills and flashings.
 - d. Fasteners, anchors, and related reinforcement.

1.2 RELATED WORK:

- A. Structural Steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Miscellaneous Metal Members: Section 05 50 00, METAL FABRICATIONS.
- C. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Aluminum and Glass Hinged Entry Doors and Storefront Construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- E. Glazing: Section 08 80 00, GLAZING.
- F. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. Approval by Contracting Officer Representative (COR) is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
 - a. Manufacturers Qualifications: Manufacturer with five (5) years continuous documented experience in design, fabrication, and installation of glazed aluminum curtain wall systems of similar type and for projects of equivalent size.
 - b. Installer: Manufacturer approved in writing who has continuously installed glazed aluminum curtain walls systems of similar type and for projects of equivalent size for previous five (5) years.
 - c. Manufacturer is to provide technical field representation at project site, as a minimum, at start of project, during middle, towards end of project, and during field testing of field mockup panel.

- d. Manufacturers Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of glazed aluminum curtain walls that are similar to those indicated for this Project in material, design, and extent.
- e. Testing Laboratory: Contractor is to retain AAMA accredited commercial testing laboratory to perform tests specified. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to perform testing specified in this section.
- f. Product Options: Information on construction documents establishes requirements for aesthetic effects and performance characteristics of glazed aluminum curtain wall system. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one (1) or more methods including preconstruction testing, field testing, or in-service performance.
 - 1) Do not modify intended aesthetic effects. If modifications are proposed, submit comprehensive explanatory data for review.
- g. Qualification of Welders:
 - 1) Welding is to be performed by certified welders qualified in accordance with AWS D1.2/D1.2M, using procedures, materials, and equipment of the type required for this work.

B. Mockup:

- 1. Construct, at job site, full size typical wall unit which incorporates horizontal and vertical joints, framing, window units, panels, glazing, sealants, and other accessories as detailed and specified. Mock-up wall unit location, size and design are to be as indicated on construction documents. Orient mockup to be facing full sun when constructed.

2. Approved Mock-up

- a. After completion and approval of performance test results of job site mockup, as directed by COR, approved mock-up panel is to be used as minimum standard of comparison for entire curtain wall system.

C. Pre-Installation Conference

1. Prior to starting installation of glazed curtain wall system schedule conference with COR to demonstrate the following:
 - a. Clear understanding of construction documents.
 - b. Onsite inspection and acceptance of structural and pertinent structural details relating to curtain wall system.
 - c. Coordination of work of various trades involved. Conference is to be attended by Contractor; personnel directly responsible for installation of curtain wall system, flashing and sheet metal work, firestopping system and curtain wall manufacturer and their technical field representatives. Conflicts are to be resolved and confirmed in writing.

1.4 SUBMITTALS:

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Product Data:
 1. Manufacturer's standard details and fabrication methods.
 2. Data on finishing, components, and accessories.
 3. Instructions: Submit descriptive literature, detail specifications, performance test data and instructions for installation, and adjustments.
 4. Recommendations for maintenance and cleaning of exterior surfaces.
- C. Shop Drawings:
 1. Show elevations of glazed curtain wall system at 1:48 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, flashing and coping details, glazing details, firestopping assemblies at edge of slabs and details of installation. Show interfaces and relationships to work of other trades and continuity with adjacent thermal, weather, air and vapor barriers.
 2. Submit for curtain wall system, accessories, and mock-up. Tentative approval of drawings is to be received before fabrication of mock-up. Final approval of drawings is to be deferred pending approval of mock-up and accessories.

3. Operation and Maintenance Manuals
 - a. Submit cleaning and maintenance instructions.
- D. Samples:
 1. Submit pairs of samples of each specified color and finish on 305 mm (12-inch) long section by width of each tubular, or extruded shape section or 305 mm by 305 mm (12-inch by 12-inch) wide sections of sheet shapes.
 2. Submit corner section of framing members showing fasteners, panels, glazing methods, glazing materials, and weather-stripping. Submit one (1) sample minimum 305 mm by 305 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section, and panel, one (1) composite sample incorporating all components and features listed may be submitted.
 3. Where normal color variations are anticipated, include two (2) or more units of each sample indicating extreme limits of color variations.
- E. Glass:
 1. Specified in Section 08 80 00, GLAZING.
- F. Quality Assurance Submittals:
 1. Design Data:
 - a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings signed and sealed by a Professional Engineer (PE).
 2. Factory Test Reports:
 - a. Test Reports: Submit certified test reports, for each of following listed tests, from a qualified independent testing laboratory showing that glazed aluminum curtain wall system assembly has been tested in accordance with specified test procedures and complies with performance characteristics as indicated by manufacturer's testing procedures. Submit factory tests required except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested within last year, under conditions specified herein, resulting test reports may be submitted in lieu of listed testing. Submit appropriate testing reports for specific tests indicated below:
 - 1) Deflection and structural tests.
 - 2) Water penetration tests.

- 3) Air infiltration tests.
- 4) Delamination tests.
- 5) Thermal conductance tests.
- 6) Sound transmission loss test.

G. Manufacturer's Certificates:

1. Submit Certificates of Compliance, with specification requirements, for the following:
 - a. Metal extrusions.
 - b. Metal accessories.
 - c. Statement(s) that aluminum has been given specified thickness of anodizing or organic coating finish.
 - d. Statement(s) indicating manufacturers and installers conform with qualifications as specified.
 - e. Submit list (minimum of five (5)) of equivalent project size installations for both manufacturer and installer.

H. Manufacturer's Field Reports:

1. Submit field reports of manufacturer's field representative observations of curtain wall installation indicating observations made during inspection at beginning of project, during middle of installation and at conclusion of project.

I. Welders: Submit welders qualifications as specified.

J. Testing Laboratory: Submit Testing Laboratory qualifications.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Refer to AAMA CW 10 for care and handling of architectural aluminum from shop to site.
- B. Prior to packaging for shipment from factory, mark wall components to correspond with shop and erection drawings and their placement location and erection sequence.
- C. Prior to shipment from factory, place knocked-down lineal curtain wall members in cardboard containers and cover finished surfaces of members with protective covering of adhesive paper, waterproof tape, or strippable plastic. Do not cover metal surfaces that will be in contact with sealants after installation.
- D. Inspect materials delivered to site for damage; unload and store with ventilation, free from heavy dust, not subject to combustion products or sources of water, and to permit easy access for inspection and handling. Sealing and caulking compounds, including handling, is to be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Where glazed aluminum curtain wall systems are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying Work.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referred to in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
 - 501.8-14Test Method for Determination of Resistance of Human Impact of Window Systems Intended for Use in Psychiatric Applications
 - MCWM-1-89Metal Curtain Wall Manual
 - CW 10-12Care and Handling of Architectural Aluminum from Shop to Site
 - CW 11-85Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing
 - CW 13-85Structural Sealant Glazing Systems (A Design Guide)
 - TIR A11-04Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads
 - 501-05Methods of Test for Exterior Walls
 - 503-08Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems
 - 2605-13High Performance Organic Coatings on Architectural Extrusions and Panels
- C. American Society of Civil Engineers (ASCE):
 - ASCE 7-10Minimum Design Loads for Buildings and Other Structures
- D. ASTM International (ASTM):
 - A36/A36M-12Structural Steel
 - A123/A123M-13Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - A193/A193M-14aAlloy-Steel and Stainless Steel Bolting Materials for High Temperature Service

A307-14Carbon Steel Bolts and Studs, 60,000 PSI
Tensile Strength

B209-14Aluminum and Aluminum Alloy Sheet and Plate

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

B211-12Aluminum and Aluminum Alloy Bar, Rod, Wire

B211M-12Aluminum and Aluminum Alloy Bar, Rod, Wire
(Metric)

B221-14Aluminum and Aluminum Alloy Extruded Bars,
Rods, Wire, Shapes and Tubes

B221M-13Aluminum and Aluminum Alloy Extruded Bars,
Rods, Wire, Shapes and Tubes (Metric)

B316/B316M-10Aluminum and Aluminum Alloy Rivet and Cold-
Heading, Wire, and Rods

C578-14aRigid Cellular Polystyrene Thermal Insulation

C612-14Mineral Fiber Block and Board Thermal
Insulation

C920-14aElastomeric Joint Sealants

C794-10Standard Test Method for Adhesion-In-Peel of
Elastomeric Joint Sealants.

C1193-13Guide for Use of Joint Sealants

C1363-11Thermal Performance of Building Materials and
Envelope Assemblies by Means of a Hot Box
Apparatus

C1521-13Practice for Evaluating Adhesion of Installed
Weatherproofing

D1037-12Evaluating the Properties of Wood-Base Fibers
and Particle Panel Materials

E84-14Surface Burning Characteristics of Building
Materials

E330/E330M-14Structural Performance of Exterior Windows,
Curtain Walls, and Doors by Uniform Static Air
Pressure Difference

E331-00 (R2009)Water Penetration of Exterior Windows, Curtain
Walls, and Doors By Uniform Static Air Pressure
Difference

E413-10Classification for Rating Sound Insulation

E783-02(R2010)Test Method for Field Measurement of Air
Leakage Through Installed Exterior Windows and
Doors

E1105-00(R2008)Field Determination of Water Penetration of
Installed Exterior Windows, Curtain Walls, and
Doors By Uniform or Cyclic Static Air Pressure
Differences

E. American Welding Society, Inc. (AWS):

D1.2/D.1.2M-06(R2014) ..Structural Welding Code-Aluminum

F. Military Specifications (MIL):

MIL-C-18480(Rev. B) Coating Compound, Bituminous Solvent,
Coal Tar Base

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

500 Series (2006)Metal Finishes Manual

H. Society for Protective Coatings (SSPC)

Paint 25-97 (2004)Zinc Oxide, Alkyd, Linseed Oil Primer for Use
Over Hand Cleaned Steel Type 1 and Type II

Paint 20-82 (2019)Zinc-Rich Coating, Type I-Inorganic, and Type
II-Organic.

I. U.S. Veterans Administration:

Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety
Protected

Physical Security Design Manual for VA Facilities (VAPSDG); Mission
Critical Facilities

Architectural Design Manual for VA Facilities (VASDM)

J. Environmental Protection Agency (EPA):

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

1.8 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their glazed
aluminum curtain wall system for a minimum of five (5) years from date
of installation and final acceptance by the Government. Submit
manufacturer warranty.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION:

- A. Design Requirements:
1. Basis-of-Design: RELIANCE BlastMax Curtain Wall by Oldcastle Building Envelope.
 - a. Construction: 2-1/2 inch by 7-1/2 inch mullion profiles, pressure glazed, front set, exterior glazed, stick-wall system.
 2. Curtain Wall System: Tubular aluminum sections with thermal break condition, supplementary support framing, factory prefinished, vision glass; related flashings, anchorage and attachment devices.
 3. System Assembly: Site assembled.
 4. Maximum wall framing member deflection, in a direction normal to plane of wall: 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of AAMA TIR A11 and tested in accordance with ASTM E330/E330M.
 5. Maximum wall framing member deflection when a gypsum wallboard surface is affected: 1/360 of span.
 6. Maximum Framing Member Permanent Deformation: 0.2 percent of its clear span when tested in accordance with ASTM E330/E330M for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements.
- B. No glass breakage, or damage to fasteners, hardware or accessories is permitted due to deformation design requirements indicated.
- a. Provide system complete with framing, mullions, trim, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing wall to structure as specified or indicated. Unless noted otherwise, comply with AAMA MCWM-1.
 - b. Obtain all components of curtain wall system, including framing and entrances from single manufacturer.
 - c. Fully coordinate system accessories directly incorporated and adjacent to contiguous related work and ensure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified. Coordinate continuity with adjacent thermal, weather, air and vapor barriers.

- d. Provide system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -18 degrees C to 49 degrees C (0 degrees F to 120 degrees F).
 - e. Provide wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified.
- C. Calculations: Submit professionally prepared calculations to indicate how design requirements for structural loading, thermal, and other performance criteria have been satisfied.

2.2 PERFORMANCE REQUIREMENTS:

- A. Delegated Design: Engage a qualified Professional Engineer, to design glazed aluminum curtain walls.
 - B. Conform with system performance requirements specified.
 - C. Provide curtain wall components tested in accordance with requirements below and meeting performance requirements specified:
 1. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance to a design pressure of 38.6 lb./sq. ft. as measured in accordance with ASTM E330/E330M.
2. Condensation Resistance: NFRC 500.
- a. Fixed Framing: 66 CRF, minimum.
3. Water Penetration:
- a. No water penetration is to occur when wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of inward acting design wind pressure as indicated on structural drawings, but not less than 479 Pa (10 psf).
 - b. Make provision in wall construction for adequate drainage to outside of water leakage or condensation that occurs within outer face of wall. Leave drainage and weep openings in members and wall open during test.
4. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783.
- a. Static-Air-Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.

- b. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.
- 5. Deflections Test: ASTM E330/E330M, Procedure B:
 - a. No member is to deflect in a direction parallel to plane of wall, when carrying its full design load, more than an amount which will reduce edge cover or glass bite below 75 percent of design dimension. No member after deflection under full design load, is to have a clearance between itself and top of panel, glass, sash, or other part immediately below it less than 3 mm (1/8 inch); clearance between member and an operable window or door is to be minimum 1.5 mm (1/16 inch).
- 6. Sound Attenuation Through Wall System (Exterior to Interior):
 - a. STC 50, measured in accordance with ASTM E413.
- 7. Physical Security Life Safety Protected Facilities:
 - a. Provide glazed aluminum curtain walls designed to meet or exceed the design and construction standards as provided in the Physical Security Design Manual for VA Facilities: Life Safety Protected.
 - 1) Blast Resistance: Design level threat (W1) located at the standoff distance, but not greater than GP1.

2.3 MATERIALS:

- A. Extruded Aluminum Framing Members: ASTM B221M (B221); 6063-T5 extruded aluminum for non-structural components or 6063-T6 extruded aluminum for structural members; temper and alloy as recommended by manufacturer.
- B. Sheet Aluminum: ASTM B209M (B209); 6065-T5 temper and alloy as recommended by manufacturer.
 - 1. Formed flashing and closures: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
 - 2. Extruded sill members: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
- C. Steel Sections: ASTM A36/A36M.
- D. Primer: TS TT-P-645; red, for shop application and field touch-up.
- E. Fasteners:
 - 1. For Exterior Cap Retainers: ASTM A193/A193M B8 300 series, stainless steel screws.
 - 2. For Framework Connections: ASTM B211M (B211) 2024-T4 aluminum, ASTM A193/A193M B8 300 series, stainless steel, and ASTM B316 aluminum rivets, as required by connection.

3. For Anchoring Glazed Aluminum Curtain Wall to Support Structure:
ASTM A307 zinc plated steel fasteners.
- F. Shims: Metal or plastic.
- G. Joint Sealants and Accessories:
 1. In accordance with requirements specified in Section 07 92 00,
JOINT SEALANTS.
 2. Structural Flush Glazed Joints: High performance silicone sealant
applied in accordance with manufacturer's recommendations.
 3. Non-structural Flush Glazed Joints and Weather Seal Joints:
Silicone sealants applied in accordance with manufacturer's
recommendations.
 4. Structural silicone sealant performance requirements: ASTM C920.
 - a. Hardness: Type A, 30 durometer.
 - b. Ultimate Tensile Strength: 1172 kPa (170 psi).
 - c. Tensile at 150% Elongation (of original bench mark distance):
55 kPa (80 psi).
 - d. Joint Movement Capability after 14 Day Cure: +/- 50%.
 - e. Peel Strength Aluminum, After 21 Day Cure: 599 g/mm
(34 pounds per inch).
 5. Structural silicone is not be used to support dead weight of
vertical glass or panels.
 6. Comply with recommendations of sealant manufacturer for specific
sealant selections.
 7. Provide only sealants that have been tested per ASTM C794 to
exhibit adequate adhesion to samples of glass and metal equivalent
to those required for project.
 8. Exposed Metal to Metal Joints: Silicone sealant selected from
manufacturer's standard colors.
- H. Glazing Materials:
 1. As specified under Section 08 80 00, GLAZING.
 2. Glazing Gaskets:
 - a. Exterior: Continuous EPDM gaskets at each glass and spandrel
panel.
 - b. Interior: Continuous, closed cell PVC foam sealant tape, sealed
at corners.
 3. Glass Sizes and Clearances:
 - a. Accommodate glazing set forth in 08 80 00 GLAZING.

- b. Sizes indicated are nominal. Verify actual sizes required by measuring frames. Coordinate dimensions for glass and glass holding members to meet applicable minimum clearances as recommended by glass manufacturer. Do not nip glass to remove flares or to reduce oversized dimensions. All cutting is to occur in factory.

4. Glass Setting Materials:

- a. Provide head bead and drive wedge required for glass installation to suit curtain wall system in accordance with manufacture's recommendations.

2.4 FABRICATION:

- A. Curtain wall components are to be of materials and thickness indicated in construction documents. Details indicated are representative of required design and profiles. Maintain sightlines. Unless specifically indicated or specified otherwise, methods of fabrication and assembly are to be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices are to permit adjustment in three directions. No exposed fasteners are permitted.
- B. Joints: Joints exceeding +1.5 mm (+1/16") are to be mechanically fastened.
- C. Ventilation and Drainage: Direct water leakage to exterior by means of concealed drainage system and weeps. Flashings and other materials used internally are to be nonstaining, noncorrosive, and nonbleeding.
- D. Protection and Treatment of Metals:
 1. Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving shop.
 2. Provide protection against galvanic action wherever dissimilar metals are in contact, except in case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint conforming to MIL-C-18480 or apply appropriate caulking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.
- E. Metal sills and Closures: Fabricate accessories, spandrel panels, trim closures of sizes and shapes indicated from similar materials and finish as specified for wall system.

2.5 METAL FINISHES:

- A. In accordance with NAAMM AMP500 series.
- B. Dark Bronze Anodized Aluminum:
 - 1. AA-C22A41 Chemically etched medium matte, with clear anodic coating, Class 1 Architectural, 0.7-mil thick (min.).
- C. Apply one (1) coat of bituminous paint to concealed aluminum and steel in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Prior to installation of glazed curtain wall system, arrange for representative(s) of manufacturer to examine structure and substrate to determine that they are properly prepared, and ready to receive glazed curtain wall work included herein.
- B. Verifying Conditions and Adjacent Surfaces: After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in building frame.

3.2 PREPARATION:

- A. Take field dimensions and examine condition of substrates, supports, and other conditions under which work of this section is to be performed to verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Contact between aluminum and dissimilar metals are to receive a protective coating of bituminous paint for prevention of electrolytic action and corrosion.

3.3 INSTALLATION:

- A. Install and erect glazed curtain wall system and all components in accordance with written directions of curtain wall manufacturer. Match profiles, sizes, and spacing indicated on approved shop drawings.
- B. Bench Marks and Reference Points: Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of marks, stop erection work in that area until discrepancies have been corrected.
- C. Ensure that drainage system operates properly in accord with AAMA 501 procedures.

- D. Do not proceed with structural silicone work when metal temperature is below 0 degrees C (32 degrees F).
- E. Isolate between aluminum and dissimilar metals with protective coating or plastic strip to prevent electrolytic corrosion.
- F. Install glazed aluminum curtain wall system so as to maintain a virtually flat face cap, with no visible bowing.
- G. Install entire system so that fasteners are not visible.
- H. Tolerances:
 - 1. Maximum variation from plane or location shown on approved shop drawings: 3 mm per 3657 mm (1/8 inch per 12 feet) of length up to not more than 13 mm (1/2 inch) in any total length.
 - 2. Maximum offset from true alignment between two (2) identical members abutting end to end in line: 0.8 mm (1/32 inch).
 - 3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 19 mm (3/4 inch) and minimum of 6 mm (1/4 inch).
- I. Joint Sealants:
 - 1. Joint Sealants: Are to be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
 - 2. Surfaces to be primed and sealed are to be clean, dry to touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions are to conform to approved detail drawings with a tolerance of plus 3 mm (1/8 inch). Do not apply compound unless ambient temperature is between 5 and 35 degrees C (40 and 90 degrees F). Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings are to be of type that leave no residue on metals.
 - 3. Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound is to be uniformly smooth and free of wrinkles and, unless indicated otherwise, is to be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four (4) hours, but at no time is this amount exceed 19 liters (5 gallons).

4. Apply primer to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after sealant work is completed.
5. Tightly pack backing in bottom of joints which are over 13 mm (1/2 inch) in depth with specified backing material to depth indicated in construction documents. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.
6. Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.
7. Remove compound smears from surfaces of materials adjacent to sealed joints as work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with solvent approved by sealant and curtain wall manufacturers. Upon completion of sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

J. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawings for glass types. Install in accordance with manufacturer's recommendations as modified herein.
2. Before installing glass, inspect sash and frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.
3. Clean sealing surfaces at perimeter of glass and sealing surfaces of rebates and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets.
4. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer and by curtain wall manufacturer.
5. Provide sashes designed for outside glazing.
6. Provide continuous snap in glazing beads to suit glass as specified.
7. Insulating and tempered glass, and glass of other types that exceed 2540 mm (100 united inches) in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant.

Provide perimeter frames and ventilator sections with glazing rebates for unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.

8. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Provide weeping of lock-strip gaskets in accordance with recommendation of glass manufacturer.

K. Metal Copings:

1. Refer to Section 07 60 00, FLASHING AND SHEET METAL for requirements of metal copings when they are not a part of glazed curtain wall system work.
2. Coordinate curtain wall installation with metal coping detail on construction documents. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

SPEC WRITER NOTE: Delete the following article if no operating components such as windows and doors are part of curtain wall assembly.

3.4 ADJUSTING:

- A. Adjust doors to provide a tight fit at contact points and operate easily.
- B. Adjust weather-stripping to make even contact with surfaces.
- C. Adjust operating hardware and moving parts.

3.5 CLEANING:

- A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
- C. Remove excess glazing and sealant compounds, dirt, and other substances.
- D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.
- E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint spots, compounds, and other defacements, and clean metal fixed panels. Remove and replace components that cannot be cleaned successfully.

3.6 FIELD QUALITY CONTROL:

- A. Testing Agency: Engage an AAMA accredited commercial qualified independent testing and inspecting agency to perform field quality-control tests specified, and to prepare test reports: Submit information regarding testing laboratory's facilities and qualifications of technical personnel to COR for approval.
- B. Conduct field check test for water leakage on designated wall areas after erection to comply with AAMA MCWM-1. Conduct test on two (2) wall areas, two (2) bays wide by two (2) stories high where directed. Conduct test and take necessary remedial action as directed by COR.
- C. Test Specimen:
 - 1. Test specimen is to include curtain wall assembly and construction. Test chamber is to be affixed to exterior side of test specimen and test is to be conducted using positive static air pressure.
 - 2. Test specimens are to be selected by COR after curtain wall system has been installed in accordance with construction documents.
- D. Sealant Adhesion Tests: Test installed sealant, in presence of sealant manufacturer's field representative, in a minimum of two (2) areas and as follows:
 - 1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13.
 - 2. Test weatherseal sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
- E. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783 and to values indicated below, whichever is more stringent.
 - 1. Field air leakage testing is not required for continuous curtain wall systems.
 - 2. Static-Air-Pressure Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
 - 3. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.
- F. Water Penetration: Test glazed aluminum curtain wall system for compliance with requirements according to AAMA 503, which requires testing according to ASTM E1105.
 - 1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 479 Pa (10 psf). No uncontrolled water is to be present.

G. Retesting:

1. Should system fail field test, system may be modified or repaired, and retested.
2. Should system fail second field test, system may be additionally modified or repaired, and retested.
3. All modifications and repairs made to tested areas are to be recorded, and same modifications and repairs made to all system and adjacent construction on project.
4. Should second test fail, COR may require testing of additional areas of the curtain wall.

H. Rejection:

1. Failure of any of specimens to meet test requirements of third test is cause for rejection of wall system and adjacent construction on project.

3.7 DEMONSTRATION, TESTING, AND ACCEPTANCE:

- A. Instruct Government's personnel in proper maintenance of windows Train personnel in procedures to follow in event of operational failures or malfunctions.
- B. Acceptance: At completion of project, and as a condition of acceptance, systems are to be operated for a period of fifteen (15) consecutive calendar days without breakdown.

3.8 PROTECTION:

- A. After installation, protect windows, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods are to be in accordance with recommendations of product manufacturers or of respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or respective trade association.

- - - END - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

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 4 13, ALUMINUM-FRAMED ENTRANCES, Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS, Section 08 71 13, AUTOMATIC DOOR OPERATORS, and Section 32 31 40, HIGH SECURITY GATE.
- 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.
- E. The following items shall be of the same manufacturer, except as otherwise specified:
 - 1. Cylindrical 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: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

- C. Samples and Manufacturers' Literature:
 - 1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.

2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

- D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

- A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Resident Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Resident Engineer's office until all other similar items have been installed in project, at which time the Resident Engineer will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 PREINSTALLATION MEETING

- A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:
1. Inspection of door hardware.
 2. Job and surface readiness.
 3. Coordination with other work.
 4. Protection of hardware surfaces.
 5. Substrate surface protection.
 6. Installation.
 7. Adjusting.
 8. Repair.
 9. Field quality control.
 10. Cleaning.

1.9 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Keying: All cylinders shall be keyed into existing 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 6 pin type. Keying information shall be furnished at a later date by the Resident Engineer.

1.10 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.
- B. American Society for Testing and Materials (ASTM):
 - F883-04.....Padlocks
 - E2180-07.....Standard Test Method for Determining the
Activity of Incorporated Antimicrobial Agent(s)
In Polymeric or Hydrophobic Materials
- C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - A156.1-06.....Butts and Hinges
 - A156.2-03.....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
 - A156.11-14.....Cabinet Locks
 - A156.12-05Interconnected Locks and Latches
 - A156.14-07Sliding and Folding Door Hardware

- A156.15-06.....Release Devices-Closer Holder, Electromagnetic
and Electromechanical
- A156.16-08.....Auxiliary Hardware
- A156.17-04Self-Closing Hinges and Pivots
- A156.18-06.....Materials and Finishes
- A156.20-06Strap and Tee Hinges, and Hasps
- A156.21-09.....Thresholds
- A156.22-05.....Door Gasketing and Edge Seal Systems
- A156.23-04.....Electromagnetic Locks
- A156.24-03.....Delayed Egress Locking Systems
- A156.25-07Electrified Locking Devices
- A156.26-06.....Continuous Hinges
- A156.28-07Master Keying Systems
- A156.29-07Exit Locks and Alarms
- A156.30-03High Security Cylinders
- A156.31-07Electric 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)

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 A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. All hinges shall be of stainless steel material.
 - 2. Interior Doors: Type A8111/A5111 for doors over 900 mm (3 feet) wide. All hinges for doors shall be of stainless steel material.
- B. Provide quantity and size of hinges per door leaf as follows:
 - 1. Doors up to 1210 mm (4 feet) high: 2 hinges.

2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
 3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
 4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
 5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 7. Provide heavy-weight hinges where specified.
 8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.
- C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.2 CONTINUOUS HINGES

- A. ANSI/BHMA A156.26, Grade 1-600.
1. Listed under Category N in BHMA's "Certified Product Directory."
- B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete
- C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
1. Base Metal for Exterior Hinges: Stainless steel.
 2. Base Metal for Interior Hinges: Stainless steel.
 3. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel.
 4. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
 5. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
 6. Provide with manufacturer's cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
 7. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.

8. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer's adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

2.3 OVERHEAD CLOSERS

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
 1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
 2. Where specified, closer shall have hold-open feature.
 3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
 4. Material of closer body shall be forged or cast.
 5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
 6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
 7. Closers shall have full size metal cover; plastic covers will not be accepted.
 8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
 9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
 10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
 11. Provide parallel arm closers with heavy duty rigid arm.

12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½" (38mm) minimum piston diameter.

2.4 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.

2.5 LOCKS AND LATCHES

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall be six pin "D" keyway. Cylinders for all locksets shall be removable core type with spring covers. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, zrim 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 19vv 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.

1. All cores to be uncombined standard Falcon C646 type, with spring covers. Coordinate with campus staff before purchasing.

- B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be LSDA 2000IC Series Grade I. Provide sectional (lever x rose) lever design matching "E lever" and "O rose" by SARGENT. 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. Provide lever design to match design selected by Architect or to match existing lever design. Where two turn pieces are specified for lock F76, turn piece on inside knob shall lock and unlock inside knob, and turn piece on outside knob shall unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)

2. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.36.

2.6 ELECTROMAGNETIC LOCKS

- A. ANSI/BHMA A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door. Listed under Category E in BHMA's "Certified Product Directory."
 1. Type: Full exterior or full interior, as required by application indicated.
 2. Strength Ranking: 1200 lbf.
 3. Inductive Kickback Peak Voltage: Not more than 53 V.
 4. Residual Magnetism: Not more than 4 lbf (18 N) to separate door from magnet.
- B. Delayed-Egress Locks: BHMA A156.24.
 1. Means of Egress Doors: Lock releases within 15 seconds after applying a force not more than 15 lbf (67 N) for not more than 3 seconds, as required by NFPA 101.
 2. Security Grade: Activated from secure side of door by initiating device.
 3. Movement Grade: Activated by door movement as initiating device.
 4. The lock housing shall not project more than 4-inches (101mm) from the underside of the frame head stop.

2.7 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-secure electric strikes at fire-rated doors.

2.8 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 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.

2.9 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.
- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.10 FLUSH BOLTS (AUTOMATIC)

- A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).
- B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.11 DOOR PULLS WITH PLATES

- A. Conform to ANSI A156.6. Pull Type J401, 152 mm CTC (6 inches CTC) length by 19 mm (3/4 inches) diameter minimum with plate Type J302, 90 mm by 381 mm (3-1/2 inches by 15 inches), unless otherwise specified. Provide pull with projection of 57.2 mm (2 1/4 inches) minimum and a clearance of 38.1 mm (1 1/2 inches) minimum. Cut plates of door pull plate for cylinders, or turn pieces where required.

2.12 PUSH PLATES

- A. Conform to ANSI A156.6. Metal, Type J302, 203 mm (8 inches) wide by 406.4 mm (16 inches) high. Provide metal Type J302 plates 102 mm (4 inches) wide by 406.4 mm (16 inches) high where push plates are specified for doors with stiles less than 203 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

2.13 COMBINATION PUSH AND PULL PLATES

- A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

2.14 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.

2.15 WEATHERSTRIPS (FOR EXTERIOR DOORS)

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m³/s/m).

2.16 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. 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.

2.17 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS

- A. Where lock is shown, equip each cabinet door (metal) with lock Type E06213, conforming to ANSI A156.36. Key locks in Key Sets approved by Contracting Officer. See mechanical drawings and specifications for location of cabinets.
- B. Cabinet manufacturer shall supply the hinges, bolts and pulls. Ship locks to cabinet manufacturer for installation.

2.18 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.
- 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.
- F. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag⁺). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.19 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 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.
- B. Hardware Heights from Finished Floor:
 - 1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
 - 2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
 - 3. Deadlocks centerline of strike 1219 mm (48 inches).
 - 4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
 - 5. Centerline of door pulls to be 1016 mm (40 inches).
 - 6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
 - 7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
 - 8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors except security bedroom, bathroom and anteroom doors which shall have closer installed parallel arm on exterior side of doors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with hex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by Resident Engineer. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

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

Door Description	Number butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

- F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.
- G. After locks have been installed; show in presence of Resident Engineer that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the Resident Engineer for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

- A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:
 - 1. Re-adjust hardware.
 - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
 - 3. Identify items that have deteriorated or failed.
 - 4. Submit written report identifying problems.

3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

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)

INTERIOR SINGLE DOORS

HW-1 (NOT USED)

HW-1A (203-54)

Each Door to Have:

RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Passage Latchset	LF210026D, TYPE F01
1 Closer	C02011/C02021
1 Kick Plate	J102
1 Mop Plate (@ Inswing Doors)	J103
1 Overhead Stop	C01541-ADJUSTABLE
1 Threshold	J32300 x 57 MM WIDTH (2-1/4 INCHES)
1 Set Seals	R0Y164

HW-1B (NOT USED)

HW-1C (NOT USED)

HW-1D (NOT USED)

HW-1E (NOT USED)

HW-1F (NOT USED)

HW-1G (NOT USED)

HW-1H (NOT USED)

HW-1J (NOT USED)

HW-1K (NOT USED)

HW-1L (NOT USED)

HW-1M (NOT USED)

HW-1N (NOT USED)

HW-1P (NOT USED)

HW-1Q (101A-54, 101B-54)

Each Door to Have:

RATED/NON-RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Storeroom Latchset	LF2400IC26D, TYPE F07
1 Kick Plate	J102
1 Closer	C02011/C02021
1 Overhead Stop	C01541-ADJUSTABLE
1 Set Self-Adhesive Seals	R0Y154

HW-1R (103-54, 110-54)

Each Door to Have:

RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Entry Latchset	LF2000IC26D, TYPE F04
1 Kick Plate	J102
1 Closer	C02011/C02021
1 Overhead Stop	C01541-ADJUSTABLE
1 Set Self-Adhesive Seals	R0Y154

HW-2 (NOT USED)

HW-2A (NOT USED)

HW-2B (NOT USED)

HW-2C (NOT USED)

HW-2D (NOT USED)

HW-2E (NOT USED)

HW-2F (NOT USED)

HW-2G (128-54)

Each Door to Have:

RATED/NON-RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Hospital Privacy Latch	LF220026D, TYPE F02 X OCCUPANCY INDICATOR
1 Closer	C02011/C02021 PROPRIETARY
1 Kick Plate	J102
1 Mop Plate (@ Inswing Doors)	J103
1 Edge Guard (@ Wood Doors)	J208M / J211 (VERIFY), CUT: HARDWARE
1 Overhead Stop	C01541-ADJUSTABLE
1 Auto Door Bottom	R0Y346 - HEAVY DUTY
2 Set Self-Adhesive Seals	R0Y154

STONE THRESHOLD BY OTHER TRADES.

HW-2H (122-54)

Each Door to Have:

NON-RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Hospital Privacy Latch	LF220026D, TYPE F02 X OCCUPANCY INDICATOR
1 Closer	C02011/C02021 PROPRIETARY
1 Kick Plate	J102
1 Mop Plate (@ Inswing Doors)	J103
1 Edge Guard (@ Wood Doors)	J208M / J211 (VERIFY), CUT: HARDWARE
1 Overhead Stop	C01541-ADJUSTABLE
1 Auto Door Bottom	R0Y346 - HEAVY DUTY
2 Set Self-Adhesive Seals	R0Y154

STONE THRESHOLD BY OTHER TRADES.

HW-2J (NOT USED)

HW-2K (NOT USED)

HW-3 (NOT USED)

HW-3A (NOT USED)

HW-3B (NOT USED)

HW-3C (NOT USED)

HW-3D (NOT USED)
HW-3E (NOT USED)
HW-3F (NOT USED)
HW-3G (NOT USED)
HW-3H (NOT USED)
HW-3J (NOT USED)

HW-4 (NOT USED)
HW-4A (NOT USED)
HW-4B (NOT USED)
HW-4C (NOT USED)
HW-4D (NOT USED)
HW-4E (NOT USED)
HW-4F (NOT USED)
HW-4G (NOT USED)
HW-4H (NOT USED)
HW-4J (NOT USED)
HW-4K (NOT USED)
HW-4L (NOT USED)

HW-4M (108-54)

Each Door to Have:

NON-RATED

1	Continuous Hinge	x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Entry Latchset	LF2000IC26D, TYPE F04
1	Heavy-Duty Armor Plate	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Edge Guard (@ Wood Doors)	J208M / J211 (VERIFY), CUT: HARDWARE
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0Y154

HW-4N (NOT USED)
HW-4P (NOT USED)
HW-4Q (NOT USED)
HW-4R (NOT USED)
HW-4S (NOT USED)
HW-4T (NOT USED)
HW-4U (NOT USED)
HW-4V (NOT USED)
HW-4X (NOT USED)
HW-4Y (NOT USED)
HW-5 (NOT USED)
HW-5A (NOT USED)
HW-5B (NOT USED)
HW-5C (NOT USED)
HW-5D (NOT USED)
HW-5E (NOT USED)
HW-5F (NOT USED)
HW-5G (NOT USED)
HW-5H (NOT USED)
HW-5J (NOT USED)
HW-5K (NOT USED)
HW-5L (NOT USED)

HW-6 (200-54)

Each Door to Have:

RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Exit Device	TYPE 1 F01 LEVER
1 Closer	C02011/C02021
1 Overhead Stop	C01541-ADJUSTABLE
1 Set Self-Adhesive Seals	R0Y154

HW-6A (NOT USED)
HW-6B (NOT USED)
HW-6C (NOT USED)
HW-6D (NOT USED)
HW-6E (NOT USED)

HW-6F (101.2-54)

Each [ADO] Door to Have:

RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Exit Device	TYPE 1 F01 LEVER PROPRIETARY
1	Electric Strike	PROPRIETARY
2	ADO Actuators	4" x 4"
2	PIR Request-To-Exit Sensors	PROPRIETARY
2	Armor Plates	J101 x 1.275 MM (0.050 INCH) THICKNESS
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0Y154

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

HW-6G (NOT USED)

HW-7 (NOT USED)

HW-7A (NOT USED)

HW-7B (NOT USED)

INTERIOR PAIRS OF DOORS

HW-8 (NOT USED)

HW-8A (NOT USED)

HW-8B (NOT USED)

HW-8C (NOT USED)

HW-8D (NOT USED)

HW-8E (NOT USED)

HW-8F (NOT USED)

HW-9 (NOT USED)

HW-10 (NOT USED)

HW-10A (NOT USED)

HW-10B (121-54)

Each Pair to Have:

NON-RATED/RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Set Auto Flush Bolts	TYPE 25 LESS BOTTOM BOLT
1 Entry Latchset	LF2000IC26D, TYPE F04
1 Dummy Trim	
1 Overlapping Astragal with Self-Adhesive Seal	R0Y634 x R0Y154 x THRU-BOLTS
2 Closers	C02011/C02021
2 Kick Plates	J102
2 Edge Guard (@ Wood Doors)	J208M / J211 (VERIFY), CUT: HARDWARE
2 Overhead Stops	C01541-ADJUSTABLE

HW-10C (NOT USED)

HW-10D (NOT USED)

HW-10E (NOT USED)

HW-10F (NOT USED)

HW-10G (NOT USED)

HW-10H (NOT USED)

HW-10J (NOT USED)

HW-10K (NOT USED)

HW-10L (NOT USED)

HW-10M (NOT USED)

HW-11 (106-54, 123-54)

Each Pair to Have:

RATED/NR

Hinges	QUANTITY & TYPE AS REQUIRED
1 Set Auto Flush Bolts	TYPE 25 LESS BOTTOM BOLT
1 Storeroom Lock	LF2400IC26D, TYPE F07
1 Coordinator	TYPE 21A
1 Overlapping Astragal with Self-Adhesive Seal	R0Y634 x R0Y154 x THRU-BOLTS
2 Closers	C02011/C02021
2 Kick Plates	J102
1 Set Self-Adhesive Seals	R0Y154

HW-11A (NOT USED)

HW-11B (NOT USED)

HW-11C (NOT USED)

HW-12 (100D-54, 100E-54)

Each Pair to Have:

RATED

Hinges	QUANTITY & TYPE AS REQUIRED
2 Exit Device	TYPE 7 or 8 F01 PROPRIETARY
1 Set Meeting Stile Astragals	R0Y834
2 Closers	C02011/C02021 PROPRIETARY
2 Magnetic Holders	C00011 TRI-VOLTAGE
1 Set Self-Adhesive Seals	R0Y154

HW-12A (NOT USED)

HW-12B (NOT USED)

HW-12C (NOT USED)

HW-12D (NOT USED)

HW-12E (NOT USED)

HW-12F (NOT USED)

HW-12G (NOT USED)

HW-12H (NOT USED)

HW-12J (NOT USED)

HW-13 (NOT USED)

EXTERIOR SINGLE DOORS

HW-E1 (NOT USED)

HW-E2 (NOT USED)

HW-E3 (NOT USED)

HW-E4 (NOT USED)

HW-E5 (NOT USED)

EXTERIOR PAIRS OF DOORS

HW-E6 (NOT USED)

HW-E7 (NOT USED)

HW-E8 (NOT USED)

HW-E9 (NOT USED)

HW-E10 (NOT USED)

EXTERIOR SINGLE GATES

HW-G1 (ANTI-RAM SWING GATE)

Each Gate to Have:

NON-RATED

1 Magnetic Lock PROPRIETARY

MAGNETIC LOCK TO BE CONTROLLED FROM WORKROOM 120-54.

MAGNETIC LOCK NOT TO PERFORM ANY ANTI-RAM RESISTANCE FORCES.

BALANCE OF HARDWARE BY SECTION 32 31 40, HIGH SECURITY GATE.

HW-G2 (NOT USED)

HW-G3 (NOT USED)

HW-G4 (NOT USED)

HW-G5 (NOT USED)

EXTERIOR PAIRS OF GATES

HW-G6 (NOT USED)

HW-G7 (NOT USED)

HW-G8 (NOT USED)

HW-G9 (NOT USED)

HW-G10 (NOT USED)

RESIDENTIAL UNIT SINGLE DOORS

HW-R1 (NOT USED)

HW-R1A (NOT USED)

HW-R2 (105A-54, 107A-54, 108A-54, 109A-54, 114A-54, 116A-54, 118A-54,
119A-54, 124A-54, 125A-54, 126A-54)

Each Door to Have:

NON-RATED

Double-Swing Hinges	QUANTITY & TYPE AS REQUIRED
1 Wall Stop	L02101 CONVEX

HW-R2A (NOT USED)

HW-R2B (NOT USED)

HW-R2C (NOT USED)

HW-R3 (NOT USED)

HW-R3A (NOT USED)

HW-R4 (NOT USED)

HW-R5 (NOT USED)

RESIDENTIAL UNIT PAIRS OF DOORS

HW-R6 (NOT USED)

HW-R7 (NOT USED)

HW-R7A (105B-54, 107B-54, 109B-54, 114B-54, 116B-54, 118B-54, 119B-54,
124B-54, 125B-54, 126B-54)

Each Door to Have:

NON-RATED/RATED

Hinges	QUANTITY & TYPE AS REQUIRED
1 Entry Latchset	LF2000IC26D, TYPE F04
1 Coordinator	TYPE 21A
1 Overlapping Astragal with Self-Adhesive Seal	R0Y634 x R0Y154 x THRU-BOLTS
2 Closer	C02011 PROPRIETARY
2 Overhead Stops	C01541-ADJUSTABLE
1 Door Viewer	L03221 - 190°
1 Threshold	J32300 x 57 MM WIDTH (2-1/4 INCHES)
2 Auto Door Bottom	R0Y346 - HEAVY DUTY
2 Sets Self-Adhesive Seals	R0Y154

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

SECURITY DOOR OPENINGS (SDO)

SDO-101 (117.1-54)

Each [ADO] Door to Have:

NON-RATED

1	Continuous Hinges	
1	Exit Devices	TYPE 1 F01 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	FREE OPERATION FROM EITHER SIDE DURING NORMAL DAYTIME OPERATION PROPRIETARY
2	ADO Actuators	4" x 4" DEACTIVATE OUTSIDE OF NORMAL DAYTIME OPERATION
1	PIR Request-To-Exit Sensor	PROPRIETARY
1	Latch Protectors (outswing dr)	
1	Set Alarm Contacts	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Closer	PROPRIETARY
1	Overhead Stop	
1	Threshold	J32120 x SILICONE GASKET
1	Door Sweep	R0Y416
1	Set Frame Seals	R0Y164
1	Card Reader, Single Authentication, Exterior Only	PROPRIETARY

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- SECURITY CONTROL CENTER

SDO-102 (117.2-54)

Each [ADO] Door to Have:

RATED

1	Continuous Hinges	
1	Exit Device	TYPE 1 F07 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	PIR Request-To-Exit Sensor	PROPRIETARY
1	Latch Protectors (outswing dr)	
1	Set Alarm Contacts	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Closer	PROPRIETARY
1	Overhead Stop	
1	Threshold	J32120 x SILICONE GASKET
1	Door Sweep	R0Y416
1	Set Frame Seals	R0Y164
1	Card Reader, Dual Authentication, Exterior: Card and PIN Interior: None	PROPRIETARY
1	Hold Open Alarm	PROPRIETARY
1	Intercom	AUDIO ONLY, CONNECT TO WORKROOM 120-54, PROPRIETARY

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- PATIENT WANDERING
- EMERGENCY PHONE/CALL-BOX

- PUBLIC ADDRESS / MASS NOTIFICATION SYSTEM
- SECURITY CONTROL CENTER

DOOR TO RESIST DESIGN BLAST LOADS

SDO-103 (100A-54, 100F-54)

Each Door to Have:

NON-RATED

- | | | |
|---|--|------------------------------|
| 1 | Continuous Hinges | |
| 1 | Exit Device | TYPE 1 F07 LEVER PROPRIETARY |
| 1 | Magnetic Lock | PROPRIETARY |
| 1 | Electric Strike | PROPRIETARY |
| 1 | PIR Request-To-Exit Sensor | PROPRIETARY |
| 1 | Latch Protectors (outswing dr) | |
| 1 | Set Alarm Contacts | PROPRIETARY |
| 1 | Key Cylinder | PROPRIETARY |
| 1 | Closer | PROPRIETARY |
| 1 | Overhead Stop | |
| 1 | Threshold | J32120 x SILICONE GASKET |
| 1 | Door Sweep | R0Y416 |
| 1 | Set Frame Seals | R0Y164 |
| 1 | Drip | R0Y976 |
| 1 | Card Reader,
Dual Authentication,
Exterior: Card and PIN
Interior: Card | PROPRIETARY |
| 1 | Hold Open Alarm | PROPRIETARY |

HARDWARE TO REVERT TO ALLOWING EGRESS DURING EMERGENCY EGRESS EVENTS.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- PATIENT WANDERING (DOOR 100F-54 ONLY)
- EMERGENCY PHONE/CALL-BOX
- PUBLIC ADDRESS / MASS NOTIFICATION SYSTEM
- SECURITY CONTROL CENTER

DOORS TO RESIST DESIGN BLAST LOADS

SDO-104 (NOT USED)

SDO-105 (101.1-54, 115-54)

Each [ADO] Door to Have:

NON-RATED

1	Continuous Hinges	
1	Exit Device	TYPE 1 F07 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	PIR Request-To-Exit Sensors	PROPRIETARY
1	Latch Protectors (outswing dr)	
1	Set Alarm Contacts	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Closer	PROPRIETARY
1	Overhead Stop	
1	Threshold	J32120 x SILICONE GASKET
1	Door Sweep	R0Y416
1	Set Frame Seals	R0Y164
1	Drip	R0Y976
1	Card Reader, Dual Authentication, Exterior: Card and PIN Interior: Card	PROPRIETARY
1	Hold Open Alarm	PROPRIETARY
1	Intercom	AUDIO ONLY, CONNECT TO WORKROOM 120-54, PROPRIETARY

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- PATIENT WANDERING (DOOR 115-54 ONLY)
- SECURITY CONTROL CENTER

DOOR TO RESIST DESIGN BLAST LOADS

SDO-106 (NOT USED)

SDO-107 (NOT USED)

SDO-108 (NOT USED)

SDO-109 (NOT USED)

SDO-110 (NOT USED)

SDO-111 (NOT USED)

SDO-112 (NOT USED)

SDO-113 (133-54)

Each Pair to Have:

NON-RATED

2 Continuous Hinge

1 Storeroom Latchset

LF2400IC26D, TYPE F07 LEVER

PROPRIETARY

1 Latch Protector (outswing dr)

1 Pull, Inactive Leaf

1 Flush Bolt, Inactive Leaf

1 Alarm Contacts

PROPRIETARY

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- SECURITY CONTROL CENTER

SDO-114 (NOT USED)

SDO-115 (NOT USED)

SDO-116 (NOT USED)

SDO-117 (NOT USED)

SDO-118 (NOT USED)

SDO-119 (NOT USED)

SD0-201 (100.1-54, 100.2-54)

Each [ADO] Door to Have:

RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Exit Device	TYPE 1 F01 LEVER PROPRIETARY
1	Electric Strike	PROPRIETARY
2	Card Readers, Single Authentication	PROPRIETARY
2	PIR Request-To-Exit Sensors	PROPRIETARY
2	Armor Plates	J101 x 1.275 MM (0.050 INCH) THICKNESS
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0Y154

HARDWARE TO REVERT TO ALLOWING EGRESS DURING EMERGENCY EGRESS EVENTS.

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- SECURITY CONTROL CENTER

SDO-202 (100B-54)

Each [ADO] Pair to Have:

RATED

2	Continuous Hinges	
2	Exit Devices with Vertical Rods	TYPE 1 F07 LEVER PROPRIETARY
2	Magnetic Locks	PROPRIETARY
2	Key Cylinder	PROPRIETARY
2	Alarm Contacts	PROPRIETARY
2	Closers	PROPRIETARY
2	Kick Plates	J102
2	Overhead Stops	
2	Sets Frame Seals	R0Y164
2	Card Readers, Single Authentication, Both Sides	PROPRIETARY

HARDWARE TO REVERT TO ALLOWING EGRESS DURING EMERGENCY EGRESS EVENTS.

AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- PATIENT WANDERING
- SECURITY CONTROL CENTER

SDO-203 (120-54, 127-54, 129-54, 130-54, 131-54)

Each Door to Have:

RATED

1	Continuous Hinge	
1	Latchset	LF2400IC26D, TYPE F04 LEVER
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Alarm Contacts	PROPRIETARY
1	Closer	PROPRIETARY
2	Kick Plates	J102
1	Overhead Stop	
1	Set Frame Seal	R0Y164
1	Card Reader, Single Authentication, Exterior Only	PROPRIETARY

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- SECURITY CONTROL CENTER

SDO-204 (104.1-54, 104.2-54, 111-54)

Each Door to Have:

RATED

1	Continuous Hinge	
1	Storeroom Latchset	LF2400IC26D, TYPE F07 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Alarm Contacts	PROPRIETARY
1	Closer	PROPRIETARY
2	Kick Plates	J102
1	Overhead Stop	
1	Set Frame Seal	R0Y164
1	Card Reader,	PROPRIETARY

Single Authentication,
Exterior Only

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY CONTROL CENTER

SDO-205 (NOT USED)

SDO-206 (NOT USED)

SDO-207 (NOT USED)

SDO-208 (NOT USED)

SDO-209 (NOT USED)

SDO-210 (NOT USED)

SDO-211 (NOT USED)

SDO-212 (NOT USED)

SDO-213 (NOT USED)

SDO-214 (NOT USED)

SDO-215 (NOT USED)

SDO-216 (NOT USED)

SDO-217 (NOT USED)

SDO-218 (NOT USED)

SDO-219 (NOT USED)

SDO-220 (NOT USED)

SDO-221 (NOT USED)

SDO-222 (NOT USED)

SDO-223 (NOT USED)

SDO-224 (NOT USED)

SDO-225 (NOT USED)

SDO-226 (102-54)

Each Door to Have:

RATED

1	Continuous Hinge	
1	Exit Device	TYPE 1 F07 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	Alarm Contacts	PROPRIETARY
1	Closer	PROPRIETARY
1	Overhead Stop	
2	Kick Plates	J102
1	Set Frame Seal	R0Y164
1	Card Reader,	PROPRIETARY
	Dual Authentication,	
	Exterior: Card and PIN	
	Interior: None	

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY CONTROL CENTER

SDO-227 (NOT USED)

SDO-228 (202-54, 204-54, 205-54)

Each Door to Have:

RATED

1	Continuous Hinge	
1	Entry Latchset	LF2000IC26D, TYPE F04 LEVER PROPRIETARY
1	Magnetic Lock	PROPRIETARY
1	Electric Strike	PROPRIETARY
1	Key Cylinder	PROPRIETARY
1	Alarm Contacts	PROPRIETARY
1	Closer	PROPRIETARY
1	Overhead Stop	
2	Kick Plates	J102
1	Set Frame Seal	R0Y164
1	Card Reader,	PROPRIETARY

Dual Authentication,
Exterior: Card and PIN
Interior: None

TO BE PART OF OR MONITORED BY THE FOLLOWING SYSTEMS THAT ARE CENTRALLY
CONTROLLED ELSEWHERE ON CAMPUS:

- SECURITY SURVEILLANCE TELEVISION
- SECURITY CONTROL CENTER

SDO-229 (NOT USED)

SDO-230 (NOT USED)

SDO-231 (NOT USED)

SDO-232 (NOT USED)

SDO-233 (NOT USED)

SDO-234 (NOT USED)

SDO-235 (NOT USED) 100.1

SDO-236 (NOT USED)

- - - E N D - - -

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Automatic operators for swinging doors.

1.2 RELATED REQUIREMENTS

- A. Aluminum Frames Entrance Work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Access Control Devices: Division 28, ELECTRONIC SAFETY AND SECURITY.
- D. Electric General Wiring, Connections and Equipment Requirements: Division 26, ELECTRICAL.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
- C. Builders Hardware Manufacturers Association (BHMA):
1. BHMA A156.10-11 - Power Operated Pedestrian Doors.
- D. National Fire Protection Association (NFPA):
1. 101-15 - Life Safety Code.
- E. Underwriters Laboratories (UL):
1. 325-13 - Standard for Doors, Drapery, Gate, Louver, and Window Operators and Systems.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 2. Installation instructions.
 3. Warranty.

- D. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Test reports: Certify each product complies with specifications.
- F. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.
 - 2. Installer with project experience list.
- G. Operation and Maintenance Data:
 - 1. Care instructions for each exposed finish product.
 - 2. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Regularly manufactures specified products.
 - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Provide contact names and addresses for completed projects when requested by Contracting Officer's Representative.
- B. Installer's Qualifications: Experienced installer, approved by the manufacturer.

1.6 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant automatic door operators against material and manufacturing defects.
 - 1. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Comply with requirements of BHMA A156.10. Unless otherwise indicated on Drawings, provide operators that move doors from fully closed to fully opened position in three seconds maximum time interval, when speed adjustment is at maximum setting.
- B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.
- C. Electrical Wiring, Connections and Equipment: Motors, starters, controls, associated devices, and interconnecting wiring required for installation. Equipment and wiring as specified in Division 26, ELECTRICAL.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Proprietary selection following existing campus standards.
 - 1. Single-source all operators.
- B. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 2. Aluminum Recycled Content: 80 percent total recycled content, minimum.

2.3 SWING DOOR OPERATORS

- A. General:
 - 1. Type: Institutional type.
 - 2. Size: As recommended by manufacturer for door weight and sizes.
- B. Function:
 - 1. Provide operators, enclosed in housing, permitting opening of door by energizing motor and stopped by electrically reducing Voltage and stalling motor against mechanical stop.
 - 2. Door to close by means of spring energy, and closing force controlled by gear system and motor being used as dynamic brake without power or controlled by hydraulic closer in electro-hydraulic operators.
 - 3. Opening and Closing Speeds: Field adjustable.
 - 4. Operators with checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
 - 5. Operators capable of recycling doors instantaneously to full open position from any point in closing cycle when control switch is activated.
 - 6. When automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.
- C. Connect hardware with drive arm attached to door with pin linkage rotating in a self-lubricating bearing. Prevent doors from pivoting on shaft of operator.
- D. Operator Housing:
 - 1. ASTM B209, Type 6063-T5 aluminum alloy, 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high by 3.2 mm (0.125 inch) thick, aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems.

E. Power Operator:

1. Completely assembled and sealed unit including gear drive transmission, mechanical spring and bearings, located in aluminum case and filled with special lubricant for extreme temperature conditions. Rubber mounted units with provisions for easy maintenance and replacement, without removing door from pivots or frame.

F. Motors:

1. Provide with interlock to prevent operation when doors are electrically locked from opening.

G. Electrical Control:

1. Self-contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator.
2. Connecting Harnesses: Interlocking plugs.

H. Accessories:

1. Metal mounting supports, brackets and other accessories necessary for installation of operators at head of door frames.

I. Microprocessor Controls:

1. Multi-function microprocessor control providing adjustable hold open time (1-30 seconds) with fully adjustable opening speed, LED indications for sensor input signals and operator status and power assist close options. Control capable of receiving activation signals from any device with normally open dry contact output.
2. Hold doors held open by low Voltage applied to the continuous duty motor.
3. Controls:
 - a. Adjustable safety circuit that monitors door operation and stops opening direction of door if obstruction is sensed.
 - b. Recycle feature that reopens door if obstruction is sensed at any point during closing cycle.
 - c. Standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated on drawings.

2.4 POWER UNITS

A. Self-contained, electric operated and independent of door operator.

1. Capacity and size of power circuits according to automatic door operator manufacturer's specifications and Division 26 - ELECTRICAL.

2.5 DOOR CONTROLS

- A. Control Devices: BHMA A156.10; control opening and closing functions.
- B. Open doors when control device is actuated; hold doors in open positions; then, close doors after an adjustable time period, unless safety device or reactivated control interrupts operation.
- C. Controls:
 - 1. Card Readers:
 - a. All single-authentication card readers, at the time of the card swipe, shall interact with all electrified hardware and activate the automatic door operators.
 - b. All dual-authentication card readers, at the time of the successful PIN pad entry, shall interact with all electrified hardware and activate the automatic door operators.
 - 2. Push Plate Wall Switch: Recessed type, stainless steel push plate minimum 100 mm by 100 mm (4 inch by 4 inch), with 13 mm (1/2 inch) high letters "To Operate Door-Push" engraved on face of plate.
 - a. To be installed only where identified in the Hardware Sets.

2.6 SAFETY DEVICES

- A. Swing Doors: Install presence sensor on pull side of door to detect any person standing in door swing path and prevent door from opening.
 - 1. Time delay Switches: Adjustable between 3 to 60 seconds and control closing cycle of doors.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify door opening is correctly sized and within acceptable tolerances.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Coordinate door installation with other related work.
- C. Install manual controls and power disconnect switches recessed or semi-flush mounted in partitions.

- D. Secure operator components to adjacent construction with suitable fastenings.
- E. Conceal conduits, piping, and electric equipment, in finish work.
- F. Install power units in locations shown.
 - 1. Where units are mounted on walls, provide metal supports or shelves for units.
 - 2. Ensure equipment, including time delay switches, are accessible for maintenance and adjustment.
- G. Ensure operators are adjusted and function properly for type of expected traffic.
- H. Synchronize each leaf of pair doors to open and close simultaneously. Permit each door leaf to be opened manually, independent of other door leaf.
- I. Install controls at positions shown and ensuring convenience for expected traffic.
- J. Push Plate Wall Switches Mounting Height: 1000 mm (40 inches) maximum, unless otherwise approved by Contracting Officer's Representative.

3.3 DEMONSTRATION AND TRAINING

- A. Instruct VA personnel in proper automatic door operator operation and maintenance.
 - 1. Trainer: Manufacturer approved instructor.
 - 2. Training Time: 2 hours minimum.
- B. Coordinate instruction to VA personnel with VA Contracting Officer's Representative.

- - E N D - -

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the following:

1. Glass.
2. Glazing materials and accessories for both factory and field glazed assemblies.

1.2 RELATED WORK:

A. Factory glazed by manufacturer in following units:

1. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, WOOD DOORS.
2. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
3. Aluminum Entrances: 08 41 13 ALUMINUM ENTRANCES.
4. Glazed Curtain Walls: Section 08 44 13, GLAZED CURTAIN WALLS.

1.3 LABELS:

A. Temporary labels:

1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
2. Label in accordance with NFRC label requirements.
3. Temporary labels are to remain intact until glass is approved by Contracting Officer Representative (COR).

B. Permanent labels:

1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
 - a. Tempered glass.
 - b. Laminated glass or have certificate for panes without permanent label.
 - c. Organic coated glass.
3. Bullet resistance glass or plastic assemblies:
 - a. Bullet resistance glass or plastic assemblies in accordance with UL 752 requirements for power rating specified.
 - b. Identify each security glazing permanently with glazing manufacturer's name, date of manufacture, product number, and DOS Code number inconspicuously located in lower corner on protective side and visible after glazing is framed.
 - c. The "attack (threat) side" is to be identified in bold lettering on each side of glazing with removable label.

4. Fire rated glazing assemblies: Mark in accordance with IBC.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is to withstand applied loads, thermal stresses, thermal movements, building movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; unsafe engagement of the framing system; deflections beyond specified limits; or other defects in construction.
- B. Glazing Unit Design: Design glass, including engineering analysis meeting requirements of authorities having jurisdiction. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.
1. Design glass in accordance with ASTM E1300, and for conditions beyond the scope of ASTM E1300, by a properly substantiated structural analysis.
 2. Design Wind Pressures: In accordance with ASCE 7 and in accordance with applicable code.
 3. Wind Design Data: In accordance with ASCE 7 and in accordance with applicable code.
 4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than the structural capacity of the glazing unit, the threshold at which frame engagement is no longer safely assured, 1/100 times the short-side length, or 19 mm (0.75 inch) whichever is less.
- C. Building Enclosure Vapor Retarder and Air Barrier:
1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
 2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

1.5 SUBMITTALS:

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Certificates:

1. Certificate stating that fire-protection and fire-resistive glazing units meet code requirements for fire-resistance-rated assembly and applicable safety glazing requirements.
2. Certificate on solar heat gain coefficient when value is specified.
3. Certificate on "R" value when value is specified.
4. Certificate test reports confirming compliance with specified bullet resistive rating.
5. Certificate that blast resistant glass meets the specified requirements.

C. Manufacturer Warranty.

D. Manufacturer's Literature and Data:

1. Glass, each kind required.
2. Insulating glass units.
3. Elastic compound for metal sash glazing.
4. Putty, for wood sash glazing.
5. Glazing cushion.
6. Sealing compound.

E. Samples:

1. Size: 305 mm by 305 mm (12 inches by 12 inches).
2. Tinted glass.
3. Reflective glass.
4. Transparent (one-way vision glass) mirrors.

F. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer's test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
2. Temporary protections: The glass front and polycarbonate back of glazing are to be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces is to be approved and applied by manufacturer.
3. Edge protection: To cushion and protect glass clad, and polycarbonate edges from contamination or foreign matter, the four (4) edges are to be sealed the depth of glazing with continuous standard-thickness thermoplastic rubber tape. Alternatively, continuous channel shaped extrusion of thermoplastic rubber are to be used, with flanges extending into face sides of glazing.
4. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 degrees C (60 to 75 degrees F), during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS:

Field Measurements: Field measure openings before ordering tempered glass products to assure for proper fit of field measured products.

1.8 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer shall warranty their glazing from the date of installation and final acceptance by the Government as follows. Submit manufacturer warranty.

1. Insulating glass units to remain sealed for ten (10) years.
2. Laminated glass units to remain laminated for five (5) years.

1.9 APPLICABLE PUBLICATIONS:

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

B. American Architectural Manufacturers Association (AAMA):

- 800.....Test Methods for Sealants
- 810.1-77.....Expanded Cellular Glazing Tape

C. American National Standards Institute (ANSI):

- Z97.1-14.....Safety Glazing Material Used in
Building - Safety Performance Specifications
and Methods of Test

D. American Society of Civil Engineers (ASCE):

- 7-10.....Wind Load Provisions

E. ASTM International (ASTM):

- C542-05 (R2011).....Lock-Strip Gaskets
- C716-06.....Installing Lock-Strip Gaskets and Infill
Glazing Materials
- C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants
- C864-05 (R2011).....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers
- C920-14a.....Elastomeric Joint Sealants
- C964-07 (R2012).....Standard Guide for Lock-Strip Gasket Glazing
- C1036-11 (R2012).....Flat Glass
- C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass.
- C1172-14.....Laminated Architectural Flat Glass
- C1349-10.....Standard Specification for Architectural Flat
Glass Clad Polycarbonate
- C1376-10.....Pyrolytic and Vacuum Deposition Coatings on
Flat Glass

- D635-10.....Rate of Burning and/or Extent and Time of
Burning of Self-Supporting Plastic in a
Horizontal Position
- D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic
Sheet
- E84-14.....Surface Burning Characteristics of Building
Materials
- E119-14.....Standard Test Methods for Fire Test of Building
Construction and Material
- E1300-12a.....Load Resistance of Glass in Buildings
- E1886-13a.....Standard Test Method for Performance of
Exterior Windows, Curtain Walls, Doors, and
Impact Protective Systems Impacted by
Missile(s) and Exposed to Cyclic Pressure
Differentials
- E1996-14a.....Standard Specification for Performance of
Exterior Windows, Curtain Walls, Doors, and
Impact Protective Systems Impacted by Windborne
Debris in Hurricanes
- E2141-12.....Test Methods for Assessing the Durability of
Absorptive Electrochromic Coatings on Sealed
Insulating Glass Units
- E2190-10.....Insulating Glass Unit
- E2240-06.....Test Method for Assessing the Current-Voltage
Cycling Stability at 90 Degree C (194 Degree F)
of Absorptive Electrochromic Coatings on Sealed
Insulating Glass Units
- E2241-06.....Test Method for Assessing the Current-Voltage
Cycling Stability at Room Temperature of
Absorptive Electrochromic Coatings on Sealed
Insulating Glass Units
- E2354-10.....Assessing the Durability of Absorptive
Electrochromic Coatings within Sealed
Insulating Glass Units
- E2355-10.....Test Method for Measuring the Visible Light
Transmission Uniformity of an Absorptive
Electrochromic Coating on a Glazing Surface

- F1233-08.....Standard Test Method for Security Glazing
Materials and Systems
- F1642-12.....Test Method for Glazing and Glazing Systems
Subject to Airblast Loadings
- F. Code of Federal Regulations (CFR):
 - 16 CFR 1201-10.....Safety Standard for Architectural Glazing
Materials
- G. Glass Association of North America (GANA):
 - 2010 EditionGANA Glazing Manual
 - 2008 EditionGANA Sealant Manual
 - 2009 EditionGANA Laminated Glazing Reference Manual
 - 2010 EditionGANA Protective Glazing Reference Manual
- H. International Code Council (ICC):
 - IBC.....International Building Code
- I. Insulating Glass Certification Council (IGCC)
- J. Insulating Glass Manufacturer Alliance (IGMA):
 - TB-3001-13.....Guidelines for Sloped Glazing
 - TM-3000.....North American Glazing Guidelines for Sealed
Insulating Glass Units for Commercial and
Residential Use
- K. Intertek Testing Services - Warnock Hersey (ITS-WHI)
- L. National Fire Protection Association (NFPA):
 - 80-16.....Fire Doors and Windows
 - 252-12.....Fire Tests of Door Assemblies
 - 257-12.....Standard on Fire Test for Window and Glass
Block Assemblies
- M. National Fenestration Rating Council (NFRC)
- N. Safety Glazing Certification Council (SGCC) 2012:
Certified Products Directory (Issued Semi-Annually).
- O. Underwriters Laboratories, Inc. (UL):
 - 9-08 (R2009).....Fire Tests of Window Assemblies
 - 263-14.....Fire Tests of Building Construction and
Materials
 - 752-11.....Bullet-Resisting Equipment.
- P. U.S. Veterans Administration:
Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety
Protected

Architectural Design Manual for VA Facilities (VASDM)

R. Environmental Protection Agency (EPA):

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

PART 2 - PRODUCT

2.1 GLASS:

A. Provide minimum thickness stated and as additionally required to meet performance requirements.

1. Provide minimum 6 mm (1/4 inch) thick glass units unless otherwise indicated.

B. Obtain glass units from single source from single manufacturer for each glass type.

C. Clear Glass:

1. ASTM C1036, Type I, Class 1, Quality q3.

2.2 INSULATING GLASS UNITS:

A. Sealed Insulating Glass Units; Laminated Double-Pane.

1. Unit Make-Up:

a. Outboard: 1/4 inch Clear Low-E #2

b. Space: 1/4 inch Air

c. Spacer: Thermal Spacer

d. Inboard: 1/8 inch Clear, Clear PVB, 1/8 inch Clear Low-E #6

e. Total Dimension: 1-5/16 inches

f. SHGC: 0.23

g. Winter U-Factor: 0.33

B. Sound Attenuation Through Wall System (Exterior to Interior): STC 50, measured in accordance with ASTM E413.

C. Physical Security Life Safety Protected Facilities:

1. Provide glazed aluminum curtain walls designed to meet or exceed the design and construction standards as provided in the Physical Security Design Manual for VA Facilities: Life Safety Protected.

1) Blast Resistance: Design level threat (W1) located at the standoff distance, but not greater than GP1.

2.3 FIRE PROTECTION AND FIRE RESISTANCE GLAZING:

A. Fire-Protection-Rated Glazing: Glazing units tested for use in fire door assemblies or fire windows, UL, ITS-WHI or equivalent listed and labeled by testing agency in accordance with IBC, for fire-protection

ratings as indicated on construction documents, based upon positive-pressure testing per NFPA 257 or UL 9, and complying with NFPA 80.

1. Hose-Stream Test: Units must comply, except units having fire-protection rating of 20 minutes.
 2. Labeling: Permanently label fire-protection-rated glazing units in accordance with IBC.
 3. Safety Glazing: Comply with 16 CFR 1201, Category II.
 4. Fire-Protection-Rated Tempered Glass: For 20-minute fire-protection-rated door assemblies, of thickness scheduled.
 5. Fire-Protection-Rated Laminated Ceramic Glazing: Units made from two lites of clear, ceramic glass, 8 mm (5/16 inch) total thickness, for rating scheduled.
- B. Fire-Resistance-Rated Glazing: Glazing units tested for use in fire wall assemblies, UL, ITS-WHI or equivalent listed and labeled by testing agency in accordance with IBC for fire-resistance ratings of wall assemblies as indicated on construction documents, based upon testing according to NFPA 252 and ASTM E119 or UL 263.
1. Labeling: Permanently label fire-resistance-rated glazing units in accordance with IBC.
 2. Safety Glazing: Comply with 16 CFR 1201, Category II.

2.4 GLAZING ACCESSORIES:

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work are to have a finish that will not corrode or stain while in service. Fire rated glazing to be installed with glazing accessories in accordance with the manufacturer's installation instructions.
- B. Setting Blocks: ASTM C864:
1. Silicone type.
 2. Channel shape; having 6 mm (1/4 inch) internal depth.
 3. Shore A hardness of 80 to 90 Durometer.
 4. Block lengths: 50 mm (2 inches) except 100 to 150 mm (4 to 6 inches) for insulating glass.
 5. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
 6. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:

1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: 25 to 76 mm (1 to 3 inches).
4. Shore A hardness of 40 to 50 Durometer.

D. Glazing Tapes:

1. Semi-solid polymeric based closed cell material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
3. Complying with AAMA 800 for the following types:
 - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

F. Glazing Gaskets: ASTM C864:

1. Firm dense wedge shape for locking in sash.
2. Soft, closed cell with locking key for sash key.
3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

G. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

H. Glazing Sealants: ASTM C920, silicone neutral cure:

1. Type S.
2. Class 25 or 50 as recommended by manufacturer for application.
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.

I. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.

1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
2. Designed for dry glazing.

J. Color:

1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames to match color of the finished aluminum and be nonstaining.
2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted are to be black, gray, or neutral color.

K. Smoke Removal Unit Targets: Adhesive targets affixed to glass to identify glass units intended for removal for smoke control. Comply with requirements of local Fire Department.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verification of Conditions:

1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer is approved shop drawings.

B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units.

3.2 PREPARATION:

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL:

- A. Install in accordance with GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, and IGMA TM-3000 unless specified otherwise.

- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.
- F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.
- G. Insulating Glass Units:
 - 1. Glaze in compliance with glass manufacturer's written instructions.
 - 2. When glazing gaskets are used, they are to be of sufficient size and depth to cover glass seal or metal channel frame completely.
 - 3. Do not use putty or glazing compounds.
 - 4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
 - 5. Install with tape or gunnable sealant in wood sash.
- H. Fire Protective and Fire Resistance Glass:
 - 1. Wire Glass: Glaze in accordance with NFPA 80.
 - 2. Other fire protective and fire resistant glass: Glaze in accordance with manufacturer's installation instructions and NFPA 80.

3.4 INSTALLATION - WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 5 mm (3/16 inch) below sight line. Seal corners by butting tape and dabbing with butyl sealant.
- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 152 mm (6 inches) from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.

- F. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line. Sealant type is to be compatible with glazing tape.
- G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT) :

- A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.
- E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line. Sealant type is to be compatible with glazing tape.
- F. Trim protruding tape edge.

3.6 REPLACEMENT AND CLEANING:

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.7 PROTECTION:

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.8 GLAZING SCHEDULE:

- A. See Drawings.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 09 06 00
SCHEDULE FOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

- A. Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. MASTER PAINTING INSTITUTE: (MPI)
6/1/2019.....Architectural Painting Specification Manual

PART 2 - PRODUCTS

2.1 DIVISION 04 - MASONRY

A. Section 04 05 13, MASONRY MORTARING

FINISH CODE	MANUFACTURER	MFG. COLOR NAME
TBD	TBD	TBD

B. Section 04 20 00, UNIT MASONRY

1. FACE BRICK (FB)				
Finish Code	Size	Pattern	Manufacturer	Mfg. Color Name/No.
FB-1 FB-2	MODULAR	PATTERN: TO MATCH BRICK PATTERN AT BUILDING 1; MONK/MODIFIED FLEMISH	TO BE DETERMINED	TO BE APPROVED BY ARCHITECT AND COR PRIOR TO BRICK BEING PURCHASED OR INSTALLED.

2.2 DIVISION 05 - METALS

A. SECTION 05 31 00, STEEL DECKING

Type	Finish	Color
EPIC Metal TORIS - Vestibule	NATACOAT	TBD
EPIC Metal TORIS - Carport	NATACOAT	TBD

B. SECTION 05 51 00, METAL STAIRS

Component	Finish	Color
All Components	Hot-Dipped Galvanized	Natural

2.3 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

1. GLASS FIBER REINFORCE PLASTIC PANELS			
FINISH CODE	Finish	Manufacturer	Mfg. Color Name/No.
FRP-1	STYLE: KEMLITE/GLASBORD SIZE: 0.09" (EMBOSSSED)	CRANE COMPOSITES	TO BE SELECTED FROM MANUFACTURERS FULL RANGE OF SAMPLES TO BE SENT TO VA INTERIOR DESIGNER FOR SELECTION

2.4 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

A. SECTION 07 31 14, METAL SHINGLES

Size	Material	Manufacturer	Mfg. Color Name/No.
21" X 52" EXPOSURE: 19-3/4" X 49"	Steel PVDF Coating 125 lbs./square UL Class 4	EDCO ARROWLINE SLATE 1755-294 EDC892C	CHARCOAL GREY BLEND

B. SECTION 07 61 16, STANDING SEAM ROOFING

Material	Finish/Color
METAL ROOFING	MANUFACTURER: BERRIDGE MANUFACTURING COMPANY STYLE: CURVED TEE-PANEL PROFILE: STANDARD TEE (1" SEAM HEIGHT) COLOR: TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLOR & APPROVED BY VA.

C. SECTION 07 92 00, JOINT SEALANTS

Location	Type	Color	Manufacturer	Manufacturer Color
Masonry Control Joints	Field-Tintable Silicone	TBD	TBD	TBD
CMU Control Joints (Interior)	Pick-Resistant Silicone	TBD	TBD	TBD
Cast Stone Joints	Field-Tintable Silicone	TBD	TBD	TBD
Slab/Paving to Exterior Walls	SSL Silicone	TBD	TBD	TBD
Exterior Door Frames	Field-Tintable Silicone	TBD	TBD	TBD
Curtain Walls	Field-Tintable Silicone	TBD	TBD	TBD
Horizontal Exterior Pavement Joints	SL Silicone	TBD	TBD	TBD

2.5 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

1. Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Door	TBD
Frame	TBD

B. SECTION 08 14 00, INTERIOR WOOD DOORS

Component	Manufacturer	Type	Finish	Color
Wood Doors	Marshfield Aspiro	See Spec	Choice Laminate	TBD
Hollow Metal Frames	See 08 11 13	See 08 11 13	N/A	TBD

C. SECTION 08 41 13, ALUMINUM-FRAMED ENTRANCES

Material	Finish	Manufacturer
Aluminum	Dark Bronze	OLDCASTLE

D. SECTION 08 44 13, GLAZED CURTAIN WALLS

Material	Finish	Manufacturer
Aluminum	Dark Bronze	OLDCASTLE

E. SECTION 12 36 00, COUNTERTOPS (WINDOW STOOLS)

Room No. and Name	Material	Finish
ALL	SOLID SURFACE (SS-3)	CORIAN: CLAM SHELL

F. SECTION 08 80 00, GLAZING

Glazing Type	Manufacturer	Mfg. Color Name/No.
G-1	OLDCASTLE	CLEAR
G-2	OLDCASTLE	CLEAR, SEE SPEC
G-3	OLDCASTLE	CLEAR

2.6 DIVISION 09 - FINISHES

A. SECTION 09 30 13, CERAMIC/PORCELAIN TILING

1. CERAMIC MOSAIC TILE (GT)					
	Size	Shape	Color & Pattern	Manufacturer	Mfg. Color Name/No.
GT-1	11 3/4" X 13 7/8"	GROUT: TEC ACCUCOLOR EFX EPOXY GROUT COLOR SELECTED BY ARCHITECT FULL RANGE 1/8" JOINT	EMERALD ISLE CS96 RANDOM LINEAR MOSAIC	DALTILE	CRYSTAL SHORES
GT-2	13" X 13"	BRICK LINER MOSAIC	BL AK35	RAGNO USA	CALABRIA
B-3	2" X 2" BUILT UP BASE	GROUT TEC SABLE 925	VURBAN PUTTY SPECKLE D201	DALTILE	KEYSTONES

2. SECTION 09 30 13, CERAMIC/PORCELAIN TILING		
Finish Code	Manufacturer	Mfg. Color Name/No
CT-1	DALTILE	STYLE: VOLUME 1.0 COLOR: STEREO GREY SIZE: 6"X6" GROUT: 1/8" GROUT JOINT W/ LATICRETE EPOXY GROUT COLOR TO MATCH TILE
CT-2	DALTILE	STYLE: ARTICULO SIZE: 6" X 18" COLOR: 09 COLUMN GREY INSTALLATION: BRICK/ASHLAR FLOOR TO CEILING W/ CT 3 INSTALLED APPROX 42" FROM TILED FLOOR CT-2 CONTINUES ABOVE CT-3 GROUT: 1/8" GROUT JOINT W/ LATICRETE EPOXY GROUT COLOR TO MATCH TILE
CT-3	DALTILE	STYLE: MUSEO SIZE: 12" X 24" VERTICAL COLOR: GREY MIX MU37 MATTE GROUT: 1/8" GROUT JOINT W/ LATICRETE EPOXY GROUT COLOR TO MATCH CT2
CT-4	<u>Daltile</u>	WHERE INDICATED USE CT-2/CT-3
CT-5	DALTILE	WHERE INDICATED USE CT-2/CT-3
CT-6	DALTILE	WHERE INDICATED USE CT-2/CT-3
CT-7	DALTILE	STYLE: PORTFOLIO SIZE: 6"X12" BASE COLOR: PF04 DOVE GRAY GROUT: COLOR TO MATCH TILE
CT-8	DALTILE	STYLE: VOLUMN 1.0 SIZE: 12" X 12" COLOR: STEREO GREY
CB-1/B2	SCHLUTER	<u>STYLE: DILEX-EHK</u> <u>COLOR: CLEAR ANODIC COATING</u> <u>LOCATION: TRANSITION FROM FLOOR TILE TO WALL TILE</u>
TILE TRIM	SCHLUTER	<u>STYLE: ECK-E</u> <u>COLOR: CLEAR ANODIC COATING</u> <u>LOCATION: AT WALL TILE W/ OUTSIDE CORNERS</u>

B. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
ATC-1	PANELS 24" X 24" ANGLED REGULAR	WHITE	ARMSTRONG	704 CORTEGA
ATC-1	Exposed Suspension System 15/16"	WHITE	ARMSTRONG	PRELUDE SUSPENSION SYSTEM

C. SECTION 09 54 23, LINEAR METAL CEILINGS (LMC)

Finish Code	Strip Material	Strip Face Size	Manufacturer	Mfg Name/No.
WOOD CEILING	METALWORKS EFFECTS	6" UMPERFORATED 96 X 6 X 5/8"	ARMSTRONG	METALWORKS LINEAR CLASSICS

D. SECTION 09 65 13, RESILIENT BASE AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
B-1	Rubber Base (RB)	7 3/4"	FLEXCO	BASE SCULPTURES: REFLECTION COLOR: DRIFTWOOD TO BE CONFIRMED UPON SAMPLE ARRIVAL
	Vinyl Base (VB)			
	Resilient Stair Treads (RST)			
	Sheet Rubber Flooring (SRF)			

E. SECTION 09 65 16, RESILIENT SHEET FLOORING (RSF)

Finish Code	Pattern name	Manufacturer	Mfg. Color Name/No.
SV-1	FORESTSCAPES	TEKNOFLOR	STEEL 88069

F. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
LVT-1	6" X 48"	LVT	PHILADELPHIA COMMERCIAL	COLLECTION: IN THE GRAINII STYLE: 30/5536V COLOR: FLAXSEED 00568 INSTALLATION: BRICK
LVT-2	18" X 18"	LVT	CENTIVA	COLLECTION: VENUE STYLE: STONE COLOR: LUNA INSTALLATION: QUARTER TURN

G. SECTION 09 68 00, CARPETING (CP)

Finish Code	Pattern	Manufacture	Mfg. Color Name/No.
CPT-1	MODERN TERRAIN: BASIN 54847: INSTALLATION ASHLAR SIZE: 18"X 36"	PHILADELPHIA COMMERCIAL	BUTTE 00200
CPT-2	STEP ON IT 54587: QUARTER TURN SIZE: 24"X 24"	PHILADELPHIA COMMERCIAL	MOVE ALONG 87504

1. SECTION 09 68 00, [CARPETING], CARPET EDGE STRIP

Finish Code	Material	Manufacturer	Mfg. Color Name/No.
	Metal	SCHLUTER	SCHIENE (INTEGRATED): ALT 1: RENO-TK (SURFACE) COLOR: CLEAR ANODIC COATING

H. SECTION 09 91 00, PAINTING

1. MPI Gloss and Sheen Standards

		Gloss @60
		Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5
units, and	max 10 units	
Gloss Level 2	a high side sheen flat-"a velvet-like"	max 10
units, and		
	finish	
	10-35 units	
Gloss Level 3	a traditional "egg-shell like" finish	10-25
units, and	10-35 units	
Gloss Level 4		a "satin-
like" finish		20-35
units, and		min.
35 units		
Gloss Level 5	a traditional semi-gloss	35-70 units
Gloss Level 6a	traditional gloss	70-85 units
Gloss level 7		a high
gloss more than 85 units		

2. Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P1	LEVEL 3	DIAMOND VOGEL	0210 HIDDEN COVE
P2	LEVEL 3	DIAMOND VOGEL	0504 IN THE BLUE
P3	NOT USED	NOT USED	NOT USED
P4	LEVEL 3	DIAMOND VOGEL	0197 THISTLE GRAY
P5	LEVEL 3	DIAMOND VOGEL	OW1 ACOUSTIC WHITE

P6	LEVEL 5	DIAMOND VOGEL	0218 DRIFTING SAND
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
P			
3. Stain Code (S)	Gloss and Transparency	Manufacturer	Mfg. Color Name/No.
	Semi		
S			
S			
S			
S			
S	Opaque		
S			
S			
S			
S			
4. Clear coatings Code (CC)	Gloss	Manufacturer	Mfg. Color Name/No.
CC			
CC			

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

2.7 DIVISION 10 - SPECIALTIES

A. LOUVERS AND VENTS

Item	Material	Finish	Manufacturer	Mfg. Color Name/No.
SEE MECHANICAL	SEE MECHANICAL	FACTORY FINISH	SEE MECHANICAL	TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLORS & APPROVED BY VA.

B. SECTION 10 26 00, WALL AND DOOR PROTECTION

Item	Material	Manufacturer	Mfg. Color Name/No.
Corner Guards CG	COLOR: STAINLESS STEEL #4 SATIN, 2" WIDE X 0.059" THICK INSTALL ABOVE FLOOR BASE TO UNDER PALLADIUM 3D TRIM AND ABOVE PALLADIUM 3D TRIM TO CEILING	PAWLING	STYLE: CG-51-8 (HEIGHTS VARY DEPENDING ON CEILING HEIGHT)
Handrail WP-2	(TOP VINYL-SOLID COLOR HANDRAIL IN COLOR 0351 RIVER ROCK; STAINLESS STEEL RETURNS ON HANDRAIL; BOTTOM VINYL AND RETURNS ON BUMPER IN COLOR 0351 RIVER ROCK; VELVET FINISH; TOP OF HANDRAIL @2'10" AFF	INPRO	STYLE: 3110VV
Wall Guard WP-1	ALL PUBLIC WALLS & PATIENT ROOMS INPROPALLADIUM BEADBOARD PANELS	INPRO	IN .060"SMOKED STRATUS 5E031. INSTALL USING RIGID SHEET TRIM BETWEEN PANELS & CORNERS IN COLOR SLATE; TRIM TOP OF RWP WITH HORIZONTAL TOP CAP BOARD (PALLADIUM 3D P- 3DHTC2) IN COLOR RIVER ROCK 0351
CRASH RAIL WP-3	COLOR: 0278 SAND DUNE; VELVET FINISH	INPRO	1400; TOP OF RAIL @ 1'- 0" AFF

C. SECTION 10 28 00, TOILET, BATH AND LAUNDRY ACCESSORIES

Item	Component	Finish	Manufacturer	Mfg. Color Name/No.
Toilet Backrest	Support			
	FABRIC SHOWER CURTIAN (F-2)	COLLECTION: SHILD BY PANAZ ANTIMICROBIAL FABRIC SHOWER CURTAIN	INPRO	COLLECTION: SHILD BY PANAZ ANTIMICROBIAL FABRIC SHOWER CURTAIN STYLE: FULL CIRCLE COLOR: CREAM CITY
	PRIVACY CURTIAN (F-3)	COLLECTION: SNAP PANEL CLICKEZE	INPRO	STYLE: FULL CIRCLE SIZE: 66"X66" SNAP PANEL COLOR: CREAM CITY
	F-4 (CURTIAN MESH PANELS)	MANUFACTURER:INPRO CLICKEZE SIZE: 20" 50# MESH	INPRO	COLOR: WHITE
	CURTAIN TRACK	STYLE: CE9038	INPRO	(8' TRACK) CE8042 (45 DEGREE BEND) CE8094 (90 DEGREE BEND)

	PRIVACY CURTIAN END CAPS	STYLE: CE9038 BALL AND CHAIN ROLLERS, CE9100 END CAP WITH CHAIN, CE9080 END CAP	INPRO	
	CURTAIN CARRIERS MANUFACTURER:	STYLE: IFC-100 ROLLER CARRIER	IMPERIAL FASTENER COMPANY (IFC)	COLOR: NYLON WHEELS AND AXLE WITH BEAD CHAIN AND HARD ALUMINUM HOOK
	PRIVACY CURTAIN TIE BACKS	STLE: BALL AND CHAIN	INPRO	

2.8 DIVISION 12- FURNISHINGS

A. SECTION 12 24 00, WINDOW SHADES

Component	Material	Manufacturer	Mfg. Color Name/No.
WINDOW COVERINGS	STYLE: RB 500 ROLLER SHADE; MOTORIZED (W/ FLUSH MOUNT WALL SWITCHES AND REMOTE CONTROL OPERATION); INSIDE MOUNT, FASCIA (BRONZE), TOP AND BOTTOM COVERS, FABRIC WRAPPED HEM BAR	HUNTER DOUGLAS	FABRIC: WS SHEERWEAVE 4800, RLSG451A96F, 1% COLOR: TAUPE

B. SECTION 12 32 00, MANUFACTURED WOOD CASEWORK

Component	Finish	Manufacturer	Mfg. Color Name
<u>PLASTIC LAMINATE</u> CABINETS (PL-1)	7960k-18	WILSONART	STUDIO TEAK

C. SECTION 12 36 00, COUNTERTOPS

Type	Finish/Color
Plastic Laminate	
SOLID SURFACE (SS-1)	CORIAN CLAM SHELL
SOLID SURFACE SINKS (SS-2)	CORIAN CLAM SHELL

PART 3 - EXECUTION

3.1 FINISH SCHEDULE SYMBOLS

Symbol Definition

- ** Same finish as adjoining walls
- No color required
- E Existing
- XX To match existing
- EFTR Existing finish to remain
- RM Remove

3.2 ROOM FINISH SCHEDULE

- A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.
- B. All Finish final approval by the VA
- C. ROOM FINISH SCHEDULE: See Sheet A301

--- E N D---

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMME NO. 06054.034

JUNE 2021

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, ceiling or soffit suspended, fasteners, and accessories for the screw attachment of gypsum board or other building boards.

1.2 RELATED WORK

- A. Load bearing framing: Section 05 40 00, COLD-FORMED METAL FRAMING.
- B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- C. Pull down tabs in steel decking: Section 05 36 00, COMPOSITE METAL DECKING.
- D. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS, Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. 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 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.

2.4 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 610 mm (24 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions
- F. Openings:
 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (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.

G. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

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.

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 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. 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.
- F. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
 - 1. Install only for ceilings to receive screw attached gypsum board.
 - 2. Install in accordance with ASTM C636.
 - a. Install main runners spaced 1200 mm (48 inches) on center.
 - b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
 - c. Install wall track channel at perimeter.
- G. Installing Ceiling Bracing System:
 - 1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
 - 2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.

3.6 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- 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. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Lay in gypsum board ceiling panels: Section 09 51 00, ACOUSTICAL CEILING.

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.
 - 4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

E. 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):

- C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems
- C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board
- C840-08.....Application and Finishing of Gypsum Board
- C919-08.....Sealants in Acoustical Applications
- C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness
- C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base
- C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing
- C1658-06.....Glass Mat Gypsum Panels
- C1396-06.....Gypsum Board
- E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

- A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- 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.
- B. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.

2.2 GYPSUM SHEATHING BOARD (EXTERIOR WALL ASSEMBLIES)

- A. ASTM C1396, Type X, water-resistant core, 1/2 inch) thick.
- B. ASTM C1177, Type X.

2.3 ACCESSORIES

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.
- B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.4 FASTENERS

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire 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:

- a. Fire rated partitions.
 - b. Smoke partitions.
 - c. Sound rated partitions.
 - d. Full height partitions shown on drawings.
 - e. Corridor partitions.
2. One side of partitions or furring:
 - a. Inside of exterior wall furring or stud construction.
 - b. Room side of room without suspended ceilings.
 - c. Furring for pipes and duct shafts, except where fire rated shaft wall construction is shown.
 3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.
- B. In locations other than those specified, extend gypsum board from floor to heights as follows:
1. Not less than 100 mm (4 inches) above suspended acoustical ceilings.
 2. At ceiling of suspended gypsum board ceilings.
 3. At existing ceilings.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. 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.
 9. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 9000 mm (30 feet).
 - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- H. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:
1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
 2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
 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

- A. Install in accordance with ASTM C840, except as otherwise specified or shown.
- B. Use screws of sufficient length to secure sheathing to framing.
- C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.
- D. Apply 600 mm by 2400 mm (2 foot by 8 foot) sheathing boards horizontally with tongue edge up.
- E. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

3.4 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 5 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 - 1. Gypsum board is fastened and held close to framing or furring.
 - 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non-decorated, smoke barrier, fire rated, and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated, and sound rated construction. Sanding is not required of non-decorated surfaces.

3.5 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound 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.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies interior ceramic, porcelain tile, and window stools, waterproofing membranes for thin-set applications, crack isolation membranes, and tile backer board.

1.2 RELATED WORK:

- A. Preformed expansion joints in tile flooring: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.
- B. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.
- C. Color, Texture, Pattern, and Size of Field Tile and Trim Shapes, and Color of Grout Specified: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Metal and Resilient Edge Strips at Joints with New Resilient Flooring, and Carpeting: Section 09 65 19, RESILIENT TILE FLOORING and Section 09 68 00, CARPETING.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Samples:
1. 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(R2011).....Safe Operating Practices for Tile, Terrazzo and Marble Work
 - A108/A118/A136-14 Installation of Ceramic Tile
 - A108.01-13.....Subsurfaces and Preparations by Other Trades
 - A108.02-13.....Materials, Environmental, and Workmanship
 - A108.1A-14.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
 - A108.1B-10.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
 - A108.1C-10.....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
 - A108.4-09.....Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive
 - A108.6-10.....Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
 - A108.8-10.....Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout
 - A108.10-10.....Grout in Tilework
 - A108.13-10.....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
 - A118.1-12.....Dry-Set Portland Cement Mortar
 - A118.3-13.....Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive
 - A118.4-12.....Latex-Portland Cement Mortar

- A118.5-10.....Chemical Resistant Furan Mortars and Grouts
- A118.6-10.....Cement Grouts for Tile Installation
- A118.7-10.....High Performance Cement Grouts for Tile
Installation
- A118.9-10.....Cementitious Backer Units
- A118.10-14.....Load Bearing, Bonded, Waterproof Membranes for
Thin-Set Ceramic Tile and Dimension Stone
Installation
- A136.1-13.....Organic Adhesives for Installation of Ceramic
Tile
- A137.1-12.....American National Standard Specifications for
Ceramic Tile
- C. ASTM International (ASTM):
- A666-10.....Annealed or Cold-Worked Austenitic Stainless
Steel Sheet, Strip, Plate and Flat Bar
- A1064/A1064M-14.....Carbon-Steel Wire and Welded Wire
Reinforcement, Plain and Deformed, for Concrete
- C109/C109M-13.....Standard Test Method for Compressive Strength
of Hydraulic Cement Mortars (Using 2 inch. or
[50-mm] Cube Specimens)
- C241/C241M-13.....Abrasion Resistance of Stone Subjected to Foot
Traffic
- C348-14.....Standard Test Method for Flexural Strength of
Hydraulic-Cement Mortars
- C627-10.....Evaluating Ceramic Floor Tile Installation
Systems Using the Robinson-Type Floor Tester
- C954-11.....Steel Drill Screws for the Application of
Gypsum Board on Metal Plaster Base to Steel
Studs from 0.033 in (0.84 mm) to 0.112 in (2.84
mm) in thickness
- C979/C979M-10.....Pigments for Integrally Colored Concrete
- C1002-14.....Steel Self-Piercing Tapping Screws for the
Application of Panel Products
- C1027-09.....Test Method for Determining Visible Abrasion
Resistance of Glazed Ceramic Tile

- C1127-01 (R2009).....Standard Guide for Use of High Solids Content,
Cold Liquid-Applied Elastomeric Waterproofing
Membrane with an Integral Wearing Surface
- C1178/C1178M-13.....Standard Specification for Coated Glass Mat
Water-Resistant Gypsum Backing Panel
- C1325-14.....Non-Asbestos Fiber-Mat Reinforced Cementitious
Backer Units
- C1353/C1353M-09 (R2013)..Abrasion Resistance of Dimension Stone
Subjected to Foot Traffic Using a Rotary
Platform, Double-Head Abraser
- D1204-14.....Test Method for Linear Dimensional Changes of
Nonrigid Thermoplastic Sheeting or Film at
Elevated Temperature
- D2240-05 (R2010).....Test Method for Rubber Property - Durometer
Hardness
- D2497-07 (R2012).....Tolerances for Manufactured Organic-Base
Filament Single Yarns
- D3045-92 (R2010).....Heat Aging of Plastics Without Load
- D4397-10.....Standard Specification for Polyethylene
Sheeting for Construction, Industrial and
Agricultural Applications
- D5109-12.....Standard Test Methods for Copper-Clad
Thermosetting Laminates for Printed Wiring
Boards
- 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): Design Manual III-2007
- F. Tile Council of North America, Inc. (TCNA):
 - Handbook for Ceramic Tile Installation (2014)
 - 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.
 - b. Tile Having Abrasive Grains:
 - 1) Unglazed Ceramic Mosaic Tile: Abrasive grains throughout body of the tile.
4. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
5. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one (1) package show the same range in colors as those taken from other packages and match approved samples.
6. Factory-Applied Temporary Protective Coating:
 - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of hot applied petroleum paraffin wax.
 - b. Do not coat unexposed tile surfaces.
 - c. Pre-wax tiles set or grouted with furan or epoxy
- B. Unglazed Ceramic Mosaic Tile: Nominal 6 mm (1/4 inch) thick with cushion edges.
- C. Glazed Wall Tile: Cushion edges, glazing.
- D. Trim Shapes:
 1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Use slip resistant trim shapes for horizontal surfaces of showers
 3. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed on construction documents or specified otherwise.
 4. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.

- b. External corners including edges: Use bullnose shapes.
- c. Internal corners: Use cove shapes.
- d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
- e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
- f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
- g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
- h. For 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.
- i. 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.

2.2 BACKER UNITS:

- A. Cementitious Backer Units:
 - 1. Use in showers or wet areas.
 - 2. Conform to ASTM C1325; Type A.
 - 3. Use in maximum lengths available to minimize end to end butt joints.

2.3 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. Latex-Portland Cement Mortar: ANSI A118.4.

1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.

2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

D. Dry-Set Portland Cement Mortar: ANSI A118.1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.1.

E. 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.

G. Elastomeric Waterproofing Membrane and Bond Coat:

1. TCNA F122-14 (on ground concrete) and TCNA F112A-14 (above ground concrete).

2. ANSI A118.10.

3. One component polyurethane, liquid applied material having the following additional physical properties:

a. Hardness: Shore "A" between 40-60.

b. Elongation: Between 300-600 percent.

c. Tensile strength: Between .27 - .41 Newton per square millimeter (40-60 pounds per square inch gauge).

d. No volatile compounds (VOC).

4. Coal tar modified urethanes are not acceptable.

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.
- E. 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 WATER:

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.9 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.

2.10 FLOOR MORTAR BED REINFORCING:

- A. ASTM A1064/A1064M welded wire fabric without backing, MW3 x MW3 (2 x 2-W0.5 x W0.5).

2.11 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.

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.
- d. 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 paver tile, porcelain type; 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 (including Showers): 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, paver 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, 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.

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.
- B. Test kitchen and storage rooms.

- - - 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. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Ceiling Suspension System: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 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 at project site minimum 30 days before beginning Work of this section.
 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. VA Interior Designer.
 - c. Contractor.
 - d. Installer.
 - e. 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,
 - 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 each product complies with specifications.

1. Acoustical units, each type.

G. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer with project experience list.

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.
 - a. Project Experience List: Provide contact names and addresses for completed projects.

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 conditioned 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. Fire Resistance: ASTM E119; as component of 1 hour rated floor-ceiling or roof-ceiling assembly as applicable.
- C. Surface Burning Characteristics: When tested according to ASTM E84.
 1. Flame Spread Rating: ASTM E 1264; Class A (UL).

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide acoustical units from one manufacturer.
 1. Provide each product exposed to view from one production run.
- C. Provide suspension system from same manufacturer.

2.4 ACOUSTICAL UNITS

- A. General:
 1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
 - a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
 2. Classification: Provide type and form as follows:
 - a. Type III Units - Mineral base with water-based painted finish maximum 10 g/l VOC; Form 2 - Water felted, minimum 16 mm (5/8 inch) thick.
 - b. Type IV Units - Mineral base with membrane-faced overlay, Form 2 - Water felted, minimum 16 mm (5/8 inch) thick. Apply poly (vinyl) chloride over paint coat.

- c. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55.
- d. CAC (Ceiling Attenuation Class): ASTM E413, 33-45 range.
- e. LR (Light Reflectance): Minimum 0.80.
- 3. Lay-in panels: Sizes as indicated on Drawings, with square edges.
 - a. Sizes:
 - 1) Concealed Grid Upward Access System: 300 by 300 (12 by 12)
 - 2) Cross Score: 300 by 600 mm (12 by 24 inch) tile to simulate 300 by 300 mm (12 by 12 inch) tile edges.
 - 3) Edge and Joint Detail: Square edges and joints as required to suit suspension and access system.

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.
 - b. Extruded aluminum (at kitchen and bathing suite).
 - 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 width 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 Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Carrying Channels Secondary Framing: Cold-rolled or hot-rolled steel, black asphaltic paint finish, rust free.
 - 1. Weight per 300 m (per thousand linear feet), minimum:

Size		Cold-rolled		Hot-rolled	
mm	inches	kg	pound	kg	pound
38	1-1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

- D. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.
 - 1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).
 - a. Nailing type option for wood forms:

- 1) Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
- 2) Lower portion provided with minimum 8 mm (5/16 inch) hole to permit attachment of hangers.

b. Flush ceiling insert type:

- 1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
- 2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
- 3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

E. Clips: Galvanized steel, designed to secure framing member in place.

F. Tile Splines: ASTM C635.

G. 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

Color	Service
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. Dispose of removed materials.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 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. 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 and bracing 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 and bracing wire. Install in sides of concrete beams or joists at mid height.

2. Steel:
 - a. Install carrying channels for attachment of hanger wires.
 - 1) Size and space carrying channels to support load within performance limit.
 - 2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
 - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.
 - c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.
 - 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) on center so as to insure that specified requirements are not exceeded.
 2. Support main runners by specially designed clips attached to carrying channels.
 - E. Seismic Ceiling Bracing System:
 1. Install according to ASTM E580.
 2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.
- 3.5 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.

- - - E N D - - -

SECTION 09 54 23
LINEAR METAL CEILINGS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This Section Includes:
 - 1. Suspended metal grid ceiling system including trim.
 - 2. Decorative, linear, formed metal ceiling panels, mechanically mounted on a ceiling suspension system.
 - 3. Accessories:
 - a. Closures, trim, edge molding and all other items required to provide complete installation.
- B. Unit size, texture, finish, and color as specified.
- C. Location and extent of acoustical treatment as shown on construction documents.

1.2 RELATED WORK:

- A. Batt, Blanket and Sound Isolation Insulation: Section 07 21 13, THERMAL INSULATION.
- B. Access Doors: Section 08 31 13, ACCESS DOORS AND FRAMES.
- C. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Acoustical Ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.
- E. Sprinkler System: Section 21 10 00, WATER-BASED FIRE-SUPPRESSION SYSTEMS.
- F. Air Outlets and Inlets: Division 23, HEATING, VENTILATING, and AIR CONDITIONING.
- G. Interior Lighting: Section 26 51 00, INTERIOR LIGHTING.

1.3 QUALITY CONTROL:

- A. Qualifications:
 - 1. Manufacturer: Approval required for products of proposed manufacturer, to be based upon submission by certifying that:
 - a. Manufacturer has provided linear metal ceiling systems and related accessories as one of its principal products for a minimum of three (3) years.
 - b. Accessories required for linear metal ceiling systems are to be manufacturer's standard or other systems compatible with linear metal ceiling system manufacturer's material. Items are to be of materials and construction which provide desired functional service.

2. Installer: Approved in writing by manufacturer and having a minimum of three (3) years' experience in the installation of linear metal ceilings on projects of equivalent size.
- B. Coordination of Work: Coordinate layout and installation of linear metal ceiling units and suspension system components with other work supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any):
1. Sprinkler heads and light fixtures: Centered width of panel, unless indicated otherwise on construction documents.
 2. HVAC Air Outlets and Inlets: Planned to occur within center of panel systems or provide for equal distance on each side parallel to length of panels.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Product Data:
1. Manufacturer's standard details and fabrication methods.
 2. Data on finishing, hardware, components, and accessories.
 3. Recommendations for maintenance and cleaning of finish surfaces.
- C. Shop Drawings:
1. Submit complete composite fabrication, and installation shop drawings including associated components.
 2. Identify panel sections, trim, and other component parts, not included in manufacturer's product data, by name and material and showing design, construction, installation, and anchorage.
 3. Layout and installation details, including relation to adjacent work such as walls and bulkheads.
 4. Composite reflected ceiling plans, at 1:25 (1/4 inch) scale, showing location of all accessories, mechanical and electrical components. Indicate the following:
 - a. Joint pattern.
 - b. Ceiling suspension members.
 - c. Method of attaching hangers to building structure.
 - d. Ceiling-mounted items including light fixtures, air outlets and inlets, speakers, sprinkler heads, and access panels. Special

moldings at walls, column penetrations, and other junctures with adjoining construction.

5. Provisions for expansion and contraction.
6. Anchors and reinforcements.

D. Samples:

1. Submit pairs of samples of each specified color and finish on 305 mm (12 inch) long sections of extrusions or formed shapes for following:
 - a. Linear metal panel.
 - b. Each exposed molding and trim sections.
 - c. Suspension system members.
 - d. Filler strips.
 - e. Insulation.
 - f. End cap.
2. Where normal color variations are anticipated, include 2 units in set indicating extreme limits of color variations.
3. Integrally Colored Anodized or Prefinished Aluminum:
 - a. Sheet not less than 203 by 254 mm (8 by 10 inches).

E. Certificates:

1. Stating that linear metal ceiling system material has been given specified thickness of anodizing or organic coating finish.
2. Indicating manufacturer's and installer's meet qualifications as specified.

1.4 DELIVERY, STORAGE AND HANDLING:

- A. Materials: Deliver to site in manufacturer's original unopened containers with brand name and type clearly marked.
- B. Materials: Carefully handle and store in dry, watertight enclosures.
- C. Before installation, linear metal ceiling units are to be stored for not less than 48 hours at same temperature and relative humidity as space where they will be installed to assure temperature and moisture conditions in accordance with manufacturer's recommendations.

1.5 ENVIRONMENTAL REQUIREMENTS:

- A. Uniform temperature of not less than 16 degrees C, (60 degrees F) nor more than 27 degrees C, (80 degrees F) and a relative humidity of not more than 70 percent are to be maintained for a period of 48 hours before, during, and for 48 hours after installation of linear metal ceiling units. After above period, room temperature is not permitted to fall below 13 degrees C (55 degrees F).

1.6 SCHEDULING:

- A. Interior finish work such as plastering, gypsum board finishing, painting, concrete and terrazzo work are to be complete and dry before installation. Mechanical, electrical, and other works above ceiling line are to be completed and heating, ventilating, and air conditioning systems are to be installed and operating in order to maintain temperature and humidity requirements.

1.7 WARRANTY:

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

1.8 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referred to in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
2605-13.....High Performance Organic Coatings on
Architectural Extrusions and Panels
- C. ASTM International (ASTM):
A641/A641M-1.....Zinc-coated (Galvanized) Carbon Steel Wire
A653/A653M-20.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-
Iron Alloy-Coated (Galvannealed) by Hot-Dip
Process
B209-14.....Aluminum and Aluminum-Alloy Sheet and Plate
B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate
(Metric)
C635/C635M-17.....Manufacture, Performance, and Testing of Metal
Suspension Systems for Acoustical Tile and Lay-
In Panel Ceilings
C636/C636M-19.....Installation of Metal Ceiling Suspension
Systems for Acoustical Tile and Lay-In Panels
E90-09(2016).....Laboratory Measurement of Airborne Sound
Transmission Loss of Building Partitions
E580/E580M-20.....Application of Ceiling Suspension Systems for
Acoustical Tile and Lay-in Panels in Areas
Requiring Seismic Restraint
- D. National Association of Architectural Metal Manufacturers (NAAMM):
- E. Metal Finishes Manual (2006)

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Linear Metal Ceiling System, General:

1. Sheet Metal Characteristics: Form metal panels from sheet metal free from surface blemishes where exposed to view in finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, stains, discolorations, or other imperfections.
2. Fabrication: Die-form linear metal panels into units standard with manufacturer and finished as specified herein.

SPEC WRITER NOTE: Coordinate acoustical insulation sound absorptive pad material type, thickness, facing and width of units required for use herein with Section 07 21 13, THERMAL INSULATION. Coordinate availability of pad material and thickness with manufacturer at each time of editing this Section.

3. Sound-Absorptive Pads: Width and length to fill completely between carriers, joined at center of a panel.

B. Accessories: Stabilizer bars, clips, splices, hold down clips, and other components as required for suspended grid system.

C. Linear Metal Panels:

1. General: Formed to snap on and be securely retained on carriers without separate fasteners.

SPEC WRITER NOTE: Select type(s) and thickness required from below.

2. Aluminum Panels: ASTM B209M (B209), roll-formed sheet, alloy 3005-H26, complying with following requirements:

a. Minimum Nominal Thickness: 0.50 mm (0.020 inch).

3. Panel Performance: As follows:

a. Noise Reduction Coefficient: NRC 0.75.

D. Suspension Systems, General:

1. Standard for Metal Suspension Systems: Provide manufacturer's standard types, structural classifications, and finishes indicated that comply with ASTM C635/C635M requirements.
2. Anchors: Type as recommended by manufacturer. Size for five (5) times design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.

E. Wire for Carriers, Hangers, and Ties: ASTM A641/A641M, Class 1, zinc coating, soft temper.

1. Gage: Minimum 12 gage. Supporting a minimum of 1334 N, (300 pounds) ultimate vertical load without failure of supporting material or attachment.
- F. Hanger Rods: Mild steel, zinc coated, or protected with rust-inhibitive paint.
- G. Flat Hangers: Mild steel, zinc coated, or protected with rust-inhibitive paint.
- H. Angle Hangers: Angles with legs not less than 22 mm (7/8 inch) wide, formed with 0.82 mm (0.0365 inch) galvanized steel sheet complying with ASTM A653/A653M, Coating Designation G90, with bolted connections and 7.6 mm (5/16 inch) diameter bolts.
- I. Edge Moldings and Trim: Manufacturer's standard molding for edges and penetrations of ceiling.
- J. Carriers: Comply with ASTM A653/A653M, cold-rolled, electro-galvanized, 0.55 mm (0.0219 inch) (25 gage) minimum nominal thickness steel.
- K. Miscellaneous Components and Materials:
 1. Access Doors: Refer to Section 08 31 13, ACCESS DOORS AND FRAMES for requirements. Access doors, required for use in linear metal ceiling system, are to match adjacent ceiling panel units and be designed and equipped with suitable framing and fastenings for removal and replacement without damage. Provide locking device for this type access door as used in general access doors.
- L. Access Identification: Refer to Section 09 91 00, PAINTING for requirements of identification markers for use, with various mechanical systems above ceiling, under this section.

2.2 FINISHES:

- A. Comply with NAAMM "Metal Finishes Manual".
- B. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent ceiling units are not acceptable. Noticeable variations in same piece are not acceptable.
- D. Aluminum Finishes:
 1. Lacquered Mill Finish: AA-M10C10R1X.
 - a. Organic Coating: Manufacturer's standard, clear, organic coating.

2. Class II, Clear, Satin-Anodized Finish: AA-M32C12A212. Anodic Coating: protective and decorative, clear film; coating thickness: .0052 mm (0.2 mil minimum).
 3. Class II, Clear, Mirror-Anodized Finish: AA-M21C12A212. Anodic Coating: protective and decorative, clear film; coating thickness: .0052 mm (0.2 mil minimum).
 4. High-Performance, Organic Coating: Comply with AAMA 2605.
 5. Color and Gloss: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- E. Touch-up Paint for Concealed Items: Per manufacturer's standards.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Ceiling Areas: Conform with details, dimensions and tolerances shown on approved linear metal ceiling system composite reflected ceiling plan shop drawings.
- B. Conditions which may adversely affect linear metal ceiling system installation are to be corrected prior to commencement of linear metal ceiling system installation.
- C. Where linear metal ceiling system is installed adjacent to masonry, wash-down of adjacent masonry is to be completed prior to erection of ceiling system to prevent damage to material finish by cleaning materials.

3.2 PREPARATION:

- A. Measure each ceiling area and establish layout of linear metal panel units to balance border widths at opposite edges of each ceiling. Avoid using units less than half wide at borders.

3.3 INSTALLATION:

- A. Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C636/C636M as applicable to linear metal panel ceiling suspension system.
- B. Suspend ceiling hangers from building structural members and as follows:
 1. Install hangers plumb, free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers where required to avoid obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 3. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for structure to which hangers are attached as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail because of age, corrosion, and elevated temperatures.
 4. Space hangers not more than 1219 mm (48 inches) on center along each member supported directly from hangers, unless otherwise shown on construction documents.
- C. Install edge moldings at edge of each linear metal ceiling area and at locations where edge of units would otherwise be exposed after completion of Work. Level moldings with ceiling suspension system to level tolerance of 3 mm (1/8 inch) in 3657 mm (12 feet).
1. Masonry and Concrete: Fasten with machine screws into lead-shield-type anchors drilled into construction.
 2. Hollow Masonry or Stud Construction: Fasten with toggle bolts or similar self-expanding screw anchors.
- D. Ceiling Access Doors:
1. Ceiling access doors are to be located directly under items which require access.
- E. Scribe and cut metal panel units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.
- F. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise indicated in construction documents.
- G. Install panels with butt joints using internal concealed panel splices and in joint configurations shown on construction documents in reflected ceiling plan.
- H. Install acoustical insulation blankets at right angle to panels so that they do not hang unsupported.

3.4 CLEANING:

- A. Following installation, dirty or discolored surfaces of linear metal ceiling units are to be cleaned, in accordance with manufacturer's written recommendations, and left free from defects. Units that are damaged or improperly installed are to be removed and new units provided as directed.

3.5 PROTECTION:

- A. Protect linear metal ceiling systems from damage until final inspection and acceptance.

- - - END - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base (RB) adhered to interior walls and partitions.

1.2 RELATED REQUIREMENTS

- A. Sheet Flooring Integral Base: Section 09 65 16, RESILIENT SHEET FLOORING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. F1861-08(2012)e1 - Resilient Wall Base.
 2. D4259-88(2012) - Abrading Concrete.
- C. Federal Specifications (Fed. Spec.):
1. RR-T-650E - Treads, Metallic and Non-Metallic, Skid-Resistant.
- D. International Concrete Repair Institute (ICRI):
1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Adhesives and primers indicating manufacturer's recommendation for each application.
 3. Installation instructions.
- C. Samples:
1. Resilient Base: 150 mm (6 inches) long, each type and color.
- D. Sustainable Construction Submittals:
1. 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 FloorScore 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: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer and from one production run.
- C. Provide resilient stair treads and sheet rubber flooring from same manufacturer.
- D. Sustainable Construction Requirements:
 - 1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Flooring Adhesives and Sealants.

2.2 RESILIENT BASE

- A. Resilient Base: 3 mm (1/8 inch) thick, 100 mm (4 inches) high.
 - 1. Type: Rubber or vinyl; use one type throughout.
 - 2. ASTM F1861, Type TP thermoplastic rubber or Type TV thermoplastic vinyl, Group 2 - layered.

B. Applications:

1. Carpet Flooring Locations: Style A - Straight.
2. Other Locations: Style B - Cove.

2.3 PRIMER (FOR CONCRETE FLOORS)

- A. Primer: Type recommended by adhesive manufacturer.

2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Leveling Compound: Provide products mixed with latex or polyvinyl acetate resins.

2.5 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. 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. Resilient sheet flooring (RSF) with chemically welded seams

1.2 RELATED REQUIREMENTS

- A. Color, Pattern and Texture: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Resilient Base over Casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 1. D4259-88(2012) - Abrading Concrete.
 2. E648-15e1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 3. E662-15a - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 4. F1303-04(2014) - Sheet Vinyl Floor Covering with Backing.
- C. International Concrete Repair Institute (ICRI):
 1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair.
- D. SCS Global Services (SCS):
 1. FloorScore.

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, 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with welded seam using specified welding rod 300 mm (12 inches) square for each type, pattern and color.
 2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.

3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
 4. 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. Certificates: Certify each product complies with specifications.
1. Heat welded seaming is manufacturer's prescribed method of installation.
- E. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer with project experience list.
 2. Installer with project experience list.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Installer Qualifications:
1. Regularly installs specified products and is approved by the manufacturer.

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 conditioned facility.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Environment:
1. Work Area Ambient Temperature Range: Minimum 18 to 38 degrees C (65 to 100 degrees F) continuously, beginning 48 hours before

installation. Maintain room temperature above 18 degrees C (65 degrees F) after installation.

2. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.9 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant resilient sheet flooring against material and manufacturing defects.
 1. Warranty Period: 2 years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Sheet Flooring:
 1. Critical Radiant Flux: ASTM E648; 0.45 watts per sq.cm or more, Class I.
 2. Smoke Density: ASTM E662; less than 450.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide vinyl sheet color and pattern from one production run.

2.3 RESILIENT SHEET FLOORING

- A. Resilient Sheet Flooring (SV): ASTM F1303; Type I, Grade 1, vinyl, with backing.
 1. Wear Surface: Smooth.
 2. Wear Layer Thickness: 20 mil, 0.020" (0.5mm)
 3. Total Thickness: 0.086" (2.2mm)
- B. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
 1. Minimum Width: 80 inches

2.4 ACCESSORIES

- A. Bonding Chemical: Flooring manufacturer's standard seam bonding chemical.
- B. Adhesives: Water resistant type recommended by flooring manufacturer to suit application.
- C. Base Accessories:
 1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with flooring material.
 2. Cap Strip: Zero edge extruded flanged reducer strip compatible with flooring material approximately 25 mm (1 inch) exposed height with 13 mm (1/2 inch) flange.

D. Leveling Compound:

1. Provide cementitious type with latex or polyvinyl acetate resins additive.

E. Primer:

1. Type recommended by adhesive or flooring manufacturer.

F. Edge Strips:

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.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove existing sheet flooring to permit new installation.
 1. Do not use solvents for removing adhesives.
 2. Dispose of removed materials.
- D. Ensure interior finish work such as drywall finishing, concrete, ceiling work, and painting work is complete and dry before installation.
 1. Complete mechanical, electrical, and other work above ceiling line.
 2. Ensure heating, ventilating, and air conditioning systems are installed and operating in order to maintain temperature and humidity requirements.
- E. Correct substrate deficiencies.
 1. Fill cracks, pits, and dents with leveling compound.
 2. Grind, sand, or cut away protrusions. Grind high spots.
 3. Level flooring substrate to 3 mm (1/8 inch) maximum variation.
- F. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
 1. Mechanically clean concrete floor substrate according to ASTM D4259.
 2. Surface Profile: ICRI 310.2R CSP 3 to CSP 4.

- G. Perform flooring manufacturer's recommended bond, substrate moisture content, and pH tests.
- H. Broom or vacuum clean substrates immediately before flooring installation.
- I. Primer: Apply primer according to manufacturer's instructions.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 INSTALLATION OF FLOORING

- A. Flooring Layout:
 - 1. Arrange pattern in one direction with side and end joints pattern matched.
 - 2. Extend flooring wall-to-wall, under cabinets, casework, 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 CHEMICAL WELDING

- A. Chemically weld joints of flooring and base using bonding chemical.
 - 1. Avoid excess bonding chemical and damage to flooring surfaces.

- B. Apply bonding chemical to fuse flooring for seamless, watertight installation.
- C. Finish joints flush, free from voids, and recessed or raised areas.

3.5 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.

3.6 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.

- - E N D - -

SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the installation of luxury vinyl tile and accessories required for a complete installation.

1.2 RELATED WORK:

- A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- B. Subfloor Testing and Preparation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.
- C. Color, Pattern and Texture for Resilient Tile Flooring and Accessories: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Resilient material manufacturer's recommendations for adhesives, underlayment, primers, and polish.
 - 3. Application, installation and maintenance instructions.
- C. Samples:
 - 1. Tile: Each type, color, thickness and finish.
 - 2. Edge Strips: Each type, color, thickness and finish.
 - 3. Feature Strips: Each type, color, thickness and finish.
- D. Shop Drawings:
 - 1. Layout of patterns as shown on the construction documents.
 - 2. Edge strip locations showing types and detail cross sections.
- E. Test Reports:
 - 1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.
 - 2. Moisture and pH test results as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.4 DELIVERY:

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation are not acceptable.

1.5 STORAGE:

- A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: A company specializing in installation with minimum three (3) years' experience and employs experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program.
 - 1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
 - a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
 - b. Career long training.
 - c. Manufacturer endorsed training.
 - d. Fundamental journeyman skills certification.
- B. Furnish product type materials from the same production run.

1.7 WARRANTY:

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

1.8 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - D2047-11.....Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

- D2240-05 (R2010).....Test Method for Rubber Property—Durometer Hardness
 - D4078-02 (R2008).....Water Emulsion Floor Finish
 - E648-14c.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - E662-14.....Specific Optical Density of Smoke Generated by Solid Materials
 - E1155/E1155M-14.....Determining Floor Flatness and Floor Levelness Numbers
 - F510/F510M-14.....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
 - F710-11.....Preparing Concrete Floors to Receive Resilient Flooring
 - F925-13.....Test Method for Resistance to Chemicals of Resilient Flooring
 - F1066-04 (R2014).....Vinyl Composition Floor Tile
 - F1344-12 (R2013).....Rubber Floor Tile
 - F1700-13a.....Solid Vinyl Floor Tile
 - F1869-11.....Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - F2170-11.....Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes
 - F2195-13.....Linoleum Floor Tile
- C. Code of Federal Regulation (CFR):
- 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- D. International Standards and Training Alliance (INSTALL):

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.
- B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
- C. Smoke Density: Less than 450 per ASTM E662.
- D. Slip Resistance - Not less than 0.5 when tested with ASTM D2047.

2.2 LUXURY VINYL TILE:

- A. ASTM F1700, Class III, Printed Film Vinyl Tile, Type B.
- B. Thickness: 20 mil wear layer. Overall thickness: .120" (3.0mm).
- C. Size: see SCHEDULE OF FINISHES.

2.3 ADHESIVES:

- A. Provide water resistant type adhesive for flooring, base and accessories as recommended by the manufacturer to suit substrate conditions. VOC content to be less than the 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24). Submit manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics.

2.4 PRIMER FOR CONCRETE SUBFLOORS:

- A. Provide in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.5 LEVELING COMPOUND FOR CONCRETE FLOORS:

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix in accordance with Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

2.6 CLEANERS:

- A. Cleaners: As recommended in writing by floor tile manufacturer.

2.7 MOULDING:

- A. Provide tapered mouldings of clear anodized aluminum and types as indicated in the SCHEDULE OF FINISHES for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 6 mm (1/4 inch). Provide bevel change in level between 6 and 13 mm (1/4 and 1/2 inch) with a slope no greater than 1:2.
- B. Fasteners for Aluminum Mouldings: Stainless steel of type required for substrate condition.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

- B. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

3.2 SUBFLOOR TESTING AND PREPARATION:

- A. Prepare concrete substrates in accordance with ASTM F710.

3.3 INSTALLATION:

- A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.
- B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.
- C. Tile Layout:
 - 1. If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned.
 - 2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.
 - 3. Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.
- D. Application:
 - 1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 - 2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
 - 3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
 - 4. Roll tile floor with a minimum 45 kg (100 pound) roller.
- E. Seal joints at pipes with sealants in accordance with Section 07 92 00, JOINT SEALANTS.
- F. Installation of Edge Strips:
 - 1. Locate edge strips under center line of doors unless otherwise shown on construction documents.
 - 2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws.

3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION:

- A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- B. Keep traffic off resilient material for a minimum 72 hours after installation.
- C. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions and within the recommended time frame.
- D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.
- E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and mouldings, re-clean resilient materials.

3.5 LOCATION:

- A. Unless otherwise indicated in construction documents, install tile flooring, under areas where casework, furniture and other equipment occur.
- B. Extend tile flooring for room into adjacent closets and alcoves.

- - - E N D - - -

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. 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 painting unprimed surfaces to be painted under this Section.
2. 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.
3. Painting ferrous metal (except stainless steel) exposed to view.
4. Painting galvanized ferrous metals exposed to view.
5. Painting gypsum drywall exposed to view.
6. 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.
7. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
8. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
9. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
10. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
11. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 RELATED WORK:

A. Activity Hazard Analysis: Section 01 35 26, SAFETY REQUIREMENTS.

- B. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
- C. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS; Division 10 - SPECIALTIES; Division 11 - EQUIPMENT; Division 12 - FURNISHINGS; Division 13 - SPECIAL CONSTRUCTION; Division 14 - CONVEYING EQUIPMENT; Division 21 - FIRE SUPPRESSION; Division 22 - PLUMBING; Division 23 - HEATING; VENTILATION AND AIR-CONDITIONING; Division 26 - ELECTRICAL; Division 27 - COMMUNICATIONS; and Division 28 - ELECTRONIC SAFETY AND SECURITY sections.
- D. Prefinished flush doors with transparent finishes: Section 08 14 00, WOOD DOORS.
- E. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.
- F. Asphalt and concrete pavement marking: Section 32 17 23, PAVEMENT MARKINGS.

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 Section 09 06 00, SCHEDULE FOR FINISHES.
 - 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 MOCK-UP PANEL:

- A. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 3.05 m (10 feet) wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the COR. Paint mock-ups to include one (1) door and frame assembly.
- B. Finish and texture approved by COR will be used as a standard of quality and workmanship for remainder of work.
- C. Repaint individual areas which are not approved, as determined by the COR, until approval is received.

1.7 REGULATORY REQUIREMENTS:

- A. Paint materials 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.

1.8 SAFETY AND HEALTH

A. Apply paint materials using safety methods and equipment in accordance with the following:

1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA 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.

1.9 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):
 - ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
 - ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. ASME International (ASME):
 - A13.1-07(R2013).....Scheme for the Identification of Piping Systems
- D. Code of Federal Regulation (CFR):
 - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. Commercial Item Description (CID):
 - A-A-1272A.....Plaster Gypsum (Spackling Compound)
- F. Federal Specifications (Fed Spec):
 - TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)
- G. Master Painters Institute (MPI):
 - 1.....Aluminum Paint
 - 4.....Interior/ Exterior Latex Block Filler
 - 5.....Exterior Alkyd Wood Primer
 - 7.....Exterior Oil Wood Primer
 - 8.....Exterior Alkyd, Flat MPI Gloss Level 1
 - 9.....Exterior Alkyd Enamel MPI Gloss Level 6
 - 10.....Exterior Latex, Flat
 - 11.....Exterior Latex, Semi-Gloss
 - 18.....Organic Zinc Rich Primer
 - 22.....Aluminum Paint, High Heat (up to 590° - 1100F)
 - 27.....Exterior / Interior Alkyd Floor Enamel, Gloss
 - 31.....Polyurethane, Moisture Cured, Clear Gloss
 - 36.....Knot Sealer
 - 43.....Interior Satin Latex, MPI Gloss Level 4
 - 44.....Interior Low Sheen Latex, MPI Gloss Level 2

- 45.....Interior Primer Sealer
- 46.....Interior Enamel Undercoat
- 47.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
- 48.....Interior Alkyd, Gloss, MPI Gloss Level 6
- 50.....Interior Latex Primer Sealer
- 51.....Interior Alkyd, Eggshell, MPI Gloss Level 3
- 52.....Interior Latex, MPI Gloss Level 3
- 53.....Interior Latex, Flat, MPI Gloss Level 1
- 54.....Interior Latex, Semi-Gloss, MPI Gloss Level 5
- 59.....Interior/Exterior Alkyd Porch & Floor Enamel, Low
Gloss
- 60.....Interior/Exterior Latex Porch & Floor Paint, Low
Gloss
- 66.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC
Approved)
- 67.....Interior Latex Fire Retardant, Top-Coat (ULC
Approved)
- 68.....Interior/ Exterior Latex Porch & Floor Paint,
Gloss
- 71.....Polyurethane, Moisture Cured, Clear, Flat
- 77.....Epoxy Cold Cured, Gloss
- 79.....Marine Alkyd Metal Primer
- 90.....Interior Wood Stain, Semi-Transparent
- 91.....Wood Filler Paste
- 94.....Exterior Alkyd, Semi-Gloss
- 95.....Fast Drying Metal Primer
- 98.....High Build Epoxy Coating
- 101.....Epoxy Anti-Corrosive Metal Primer
- 108.....High Build Epoxy Coating, Low Gloss
- 114.....Interior Latex, Gloss
- 119.....Exterior Latex, High Gloss (acrylic)
- 134.....Galvanized Water Based Primer
- 135.....Non-Cementitious Galvanized Primer
- 138.....Interior High Performance Latex, MPI Gloss Level 2
- 139.....Interior High Performance Latex, MPI Gloss Level 3
- 140.....Interior High Performance Latex, MPI Gloss Level 4

141.....Interior High Performance Latex (SG) MPI Gloss
Level 5

163.....Exterior Water Based Semi-Gloss Light Industrial
Coating, 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. Provide high-performance, exterior-rated paint systems for architecturally exposed structural steel elements and exposed steel lintels. Apply such systems within a shop environment when possible.
- D. VOC Content: For field applications that are inside the weatherproofing system, paints and coating to comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Non-flat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.

- 5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 g/L.
- 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
- 7. Pretreatment Wash Primers: 420 g/L.
- 8. Shellacs, Clear: 730 g/L.
- 9. Shellacs, Pigmented: 550 g/L.
- E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

2.3 PLASTIC TAPE:

- A. Pigmented vinyl plastic film in colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES or specified.
- B. Pressure sensitive adhesive back.
- C. Widths as shown on construction documents.

2.4 BIOBASED CONTENT

- A. Paint products shall 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 shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is

- started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
2. See other sections of specifications for specified surface conditions and prime coat.
 3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
 5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. 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. Wood:
1. Sand to a smooth even surface and then dust off.
 2. Sand surfaces showing raised grain smooth between each coat.
 3. Wipe surface with a tack rag prior to applying finish.
 4. Surface painted with an opaque finish:
 - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
 - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
 5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
 6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
 7. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
 - a. Thin filler in accordance with manufacturer's instructions for application.

- b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.
- C. Ferrous Metals:
1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
 2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, 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, Aluminum, Copper and Copper Alloys
Surfaces Specified Painted:
1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
 2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer) depending on finish coat compatibility.
- 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. Wood and Wood Particleboard:
 - 1. Use same kind of primer specified for exposed face surface.
 - a. Exterior wood: MPI 7 (Exterior Oil Wood Primer) for new construction and MPI 5 (Exterior Alkyd Wood Primer) for repainting bare wood primer except where MPI 90 (Interior Wood Stain, Semi-Transparent) is scheduled.
 - b. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
 - 2. Apply two (2) coats of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) to surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reason.
 - 3. Apply one (1) coat of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
 - 4. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.

5. Apply MPI 67 (Interior Latex Fire Retardant, Top-Coat (UL Approved) to wood for fire retardant finish.
- F. Metals except boilers, incinerator stacks, and engine exhaust pipes:
1. Steel and iron: Use MPI 101 (Cold Curing Epoxy Primer) where MPI 77 (Epoxy Cold Cured), Gloss finish is specified.
 2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer)
 3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
 4. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
 5. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel).
 6. Asphalt coated metal: MPI 1 (Aluminum Paint).
 7. Metal over 94 degrees C (201 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating).
- G. Gypsum Board:
1. Surfaces scheduled to have MPI 11 (Exterior Latex, Semi-Gloss), MPI Gloss Level 1, MPI 52 (Interior Latex, MPI Gloss Level 3): Use MPI 11 (Exterior Latex, Semi-Gloss), MPI 52 (Interior Latex, MPI Gloss Level 3) respectively.
 2. Primer: MPI 50 (Interior Latex Primer Sealer), except use MPI 46 (Interior Enamel Undercoat) in shower, bathrooms, bathing suite, water service entrance/janitors closet, kitchen, and mechanical room.
 4. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 77 (Epoxy Cold Cured, Gloss).
 2. Use MPI 139 (Interior High Performance Latex, MPI Gloss level 3) as scheduled.

3.8 EXTERIOR FINISHES:

- A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Steel and Ferrous Metal:
1. Two (2) coats of MPI 9 (Exterior Alkyd Enamel) on exposed surfaces, except on surfaces over 94 degrees C (201 degrees F).
 2. One (1) coat of MPI 22 (High Heat Resistant Coating) on surfaces over 94 degrees K (290 degrees F).

3.9 INTERIOR FINISHES:

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
1. Apply to exposed surfaces.

2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
 - a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) unless specified otherwise.
 - b. Two (2) coats of MPI 51 (Interior Alkyd, Eggshell).
 - c. One (1) coat of MPI 46 (Interior Enamel Undercoat) plus one coat of MPI 47 (Interior Alkyd, Semi-Gloss) on exposed interior surfaces of alkyd-amine enamel prime finished windows.
 - 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. One (1) coat of MPI 45 (Interior Primer Sealer), MPI 46 (Interior Enamel Undercoat), plus two (2) coat of MPI 139 (Interior High Performance Latex, MPI Gloss level 3).
- D. Wood:
 1. Sanding:
 - a. Use 220-grit sandpaper.
 - b. Sand sealers and varnish between coats.
 - c. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.
 2. Sealers:
 - a. MPI 31 (gloss) or MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
 - b. Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
 - c. Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
 - d. Sand as specified.
 3. Paint Finish:
 - a. One (1) coat of MPI 45 (Interior Primer Sealer), MPI 46 (Interior Enamel Undercoat), plus one (1) coat of MPI 47 (Interior Alkyd, Semi-Gloss).

4. Transparent Finishes on Wood Except Floors.

a. Natural Finish:

- 1) One (1) coat of sealer MPI 31 (gloss) MPI 71 (flat) thinned with thinner recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.

b. Stain Finish:

- 1) One (1) coat of MPI 90 (Interior Wood Stain, Semi-Transparent).
- 2) Use wood stain of type and color required to achieve finish specified. Do not use varnish type stains.
- 3) One (1) coat of sealer MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- 4) Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat).

c. Varnish Finish:

- 1) One (1) coat of sealer MPI 71 (flat) thinned as recommended by manufacturer at rate of one (1) part of thinner to four (4) parts of varnish.
- 2) Two (2) coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat).

d. Fire Retardant Intumescent Varnish:

- 1) MPI 66 (Interior Alkyd Fire Retardant, Clear Top-Coat (UL Approved)) Intumescent Type, Fire Retardant Coating where scheduled: Two (2) coats.

5. Finish for Wood Floors:

E. Cement Board: One (1) coat of MPI 139 (Interior High Performance Latex, MPI Gloss Level 3)

F. Miscellaneous:

1. Apply where specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. MPI 1 (Aluminum Paint): Two (2) coats of aluminum paint.
3. Existing acoustical units scheduled to be repainted except acoustical units with a vinyl finish:
 - a. Clean units free of dust, dirt, grease, and other deterrents to paint adhesion.

3.10 PAINT COLOR:

A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.

- B. For additional requirements regarding color see Articles, "REFINISHING EXISTING PAINTED SURFACE" and "MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE".
- C. Coat Colors:
 - 1. Color of priming coat: Lighter than body coat.
 - 2. Color of body coat: Lighter than finish coat.
 - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
 - 1. Paint to match color of casework where casework has a paint finish.
 - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.11 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE:

- A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.
- B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified below.
- C. Paint various systems specified in Division 02 - EXISTING CONDITIONS, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY.
- D. Paint after tests have been completed.
- E. Omit prime coat from factory prime-coated items.
- F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.
- G. Omit field painting of items specified in "BUILDING AND STRUCTURAL WORK FIELD PAINTING"; "Building and Structural Work not Painted".
- H. Color:
 - 1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.

2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
 - a. White: Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
 - b. Gray: Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
 - c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
 - d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
 - e. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.
 - 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 8 (Exterior Alkyd, Flat) MPI 94 (Exterior Alkyd, Semi-gloss) 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.
 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.
- e. 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).

3.12 BUILDING AND STRUCTURAL WORK FIELD PAINTING:

- A. Painting and finishing of interior and exterior work except as specified here-in-after.
 1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
 3. Painting of ferrous metal and galvanized metal.
 4. Painting of wood with fire retardant paint exposed in attics, when used as mechanical equipment space (except shingles).
 5. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
 1. Prefinished items:
 - a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
 - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
 2. Finished surfaces:
 - a. Hardware except ferrous metal.
 - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
 - c. Signs, fixtures, and other similar items integrally finished.

3. Concealed surfaces:
 - a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
 - b. Inside walls or other spaces behind access doors or panels.
 - c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
 - a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
 - b. Tracks for overhead or coiling doors, shutters, and grilles.
5. Labels:
 - a. Code required label, such as Underwriters Laboratories Inc., Intertek Testing Service or Factory Mutual Research Corporation.
 - b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
 - a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
 - b. Gas Storage Racks.
 - c. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Face brick.
11. Structural steel encased in concrete, masonry, or other enclosure.
12. Structural steel to receive sprayed-on fire proofing.
13. Ceilings, walls, columns in interstitial spaces.
14. Ceilings, walls, and columns in pipe basements.
15. Wood Shingles.

3.13 IDENTITY PAINTING SCHEDULE:

- A. Identify designated service in new buildings or projects with extensive remodeling in accordance with ASME A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels. For existing spaces where work is minor match existing.

1. Legend may be identified using snap-on coil plastic markers or by paint stencil applications.
2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12.2 M (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
3. Locate Legends clearly visible from operating position.
4. Use arrow to indicate direction of flow using black stencil paint.
5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on construction documents where asterisk appears for High, Medium, and Low Pressure designations as follows:
 - a. High Pressure - 414 kPa (60 psig) and above.
 - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
 - c. Low Pressure - 103 kPa (14 psig) and below.
 - d. Add Fuel oil grade numbers.
6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off		Green	White	Blow-off
Boiler Feedwater		Green	White	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Blue	White	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Green	White	H.P. _____*
High Pressure Condensate Return		Green	White	H.P. Ret _____*
Medium Pressure Steam		Green	White	M. P. Stm _____*
Medium Pressure Condensate				

Return		Green	White	M.P. Ret_____*
Low Pressure Steam		Green	White	L.P. Stm_____*
Low Pressure Condensate				
Return		Green	White	L.P. Ret_____*
High Temperature Water				
Supply		Green	White	H. Temp Wtr Sup
High Temperature Water				
Return		Green	White	H. Temp Wtr Ret
Hot Water Heating Supply		Green	White	H. W. Htg Sup
Hot Water Heating Return		Green	White	H. W. Htg Ret
Gravity Condensate Return		Green	White	Gravity Cond Ret
Pumped Condensate Return		Green	White	Pumped Cond Ret
Vacuum Condensate Return		Green	White	Vac Cond Ret
(Diesel Fuel included under Fuel Oil)				
Boiler Water Sampling		Green	White	Sample
Chemical Feed		Green	White	Chem Feed
Continuous Blow-Down		Green	White	Cont. B D
Pumped Condensate		Green	White	Pump Cond
Pump Recirculating		Green	White	Pump-Recirc.
Vent Line		Green	White	Vent
Alkali		Orange	Black	Alk
Bleach		Orange	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent

Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Orange	Black	Acid Waste
Vent		Orange	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6096 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class.

8. See Sections for methods of identification, legends, and abbreviations of the following:

- a. Laboratory gas and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- b. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES /Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- c. Conduits containing high voltage feeders over 600 volts:
 Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS /
 Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS /

B. Fire and Smoke Partitions:

- 1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
- 2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.

3. Locate not more than 6096 mm (20 feet) on center on corridor sides of partitions, and with a least one (1) message per room on room side of partition.
 4. Use semi-gloss paint of color that contrasts with color of substrate.
- C. Identify columns in pipe basements and interstitial space:
1. Apply stenciled number and letters to correspond with grid numbering and lettering indicated on construction documents.
 2. Paint numbers and letters 101 mm (4 inches) high, locate 45 mm (1.8 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.

3.14 PROTECTION CLEAN UP, AND TOUCH-UP:

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

- - - E N D - - -

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies wall guards, handrail/wall guard combinations, corner guards and door/door frame protectors.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS
- B. Structural Steel Corner Guards: Section 05 50 00, METAL FABRICATIONS.
- C. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.
- D. Color and texture of aluminum and resilient material: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Manufacturer with a minimum of three (3) years' experience in providing items of type specified.
 - 1. Obtain wall and door protection from single manufacturer.
- B. Installer's Qualifications: Installers are to have a minimum of three (3) years' experience in the installation of units required for this project.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS
 - 2. For composite wood products, submit documentation indicating product contains no added urea formaldehyde.
- C. Shop Drawings: Show design and installation details.
- D. Manufacturer's Literature and Data:
 - 1. Handrail/Wall Guard Combinations.
 - 2. Wall Guards.
 - 3. Corner Guards.
 - 4. Door/Door Frame Protectors.
- 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 shall warranty their wall and door protection for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - B221-14.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 - D256-10.....Impact Resistance of Plastics
 - D635-10.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
 - E84-14.....Surface Burning Characteristics of Building Materials
- C. Aluminum Association (AA):
 - DAF 45-09.....Designation System for Aluminum Finishes
- D. American Architectural Manufacturers Association (AAMA):
 - 611-14.....Anodized Architectural Aluminum
- E. Code of Federal Regulation (CFR):
 - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- F. The National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500-06.....Metal Finishes Manual

- G. National Fire Protection Association (NFPA):
80-13.....Standard for Fire Doors and Windows
- H. SAE International (SAE):
J 1545-05(R2014).....Instrumental Color Difference Measurement for
Exterior Finishes.
- 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.
Provide aluminum alloy used for colored anodizing coating as required
to produce specified color.
- 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 ft.-lbs./sq. inch)
when tested in accordance with ASTM D256 (Izod impact, ft.-lbs.
per inch notched).
 - b. Class 1 fire rating when tested in accordance with ASTM E84,
having a maximum flame spread of 25 and a smoke developed rating
of 450 or less.
 - c. Rated self-extinguishing when tested in accordance with
ASTM D635.
 - d. Provide material labeled and tested by Underwriters Laboratories
or 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 50 mm (2 inch) long leg and 6 mm (1/4 inch) corner radius
 - 3. Height: 8 feet, unless noted otherwise in drawings.
 - 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.

2.3 WALL GUARDS AND HANDRAILS:

- A. Resilient Wall Guards and Handrails:
 - 1. Handrail/Wall Guard:
 - a. Basis of Design: Inpro, IPC, 3110VV (round) handrail
 - b. Snap-on covers of resilient material, minimum 2 mm (0.080-inch) thick.
 - c. Free-floating on a continuous, extruded aluminum retainer, minimum 2 mm (0.080-inch) thick.
 - d. Anchor to wall at maximum 762 mm (30 inches) on center.
 - 2. Provide handrails and 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 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.

2.5 FINISH:

- A. Aluminum: In accordance with AA DAF-45.
 - 1. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

- C. Stainless Steel: In accordance with NAAMM AMP 500 finish Number 4.
- D. 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.

3.2 RESILIENT WALL GUARD HANDRAIL COMBINATION

- A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. SUMMARY:

1. Section Includes: Toilet and bath accessories at dressing rooms, toilets, baths, locker rooms and other areas indicated on drawings.

1.2 RELATED REQUIREMENTS

- A. Color of finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Ceramic Toilet and Bath Accessories: Section 09 30 13, CERAMIC/PORCELAIN TILING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Society of Mechanical Engineers (ASME):
 1. B18.6.4-98(R2005) - Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws inch.
- C. American Welding Society (AWS):
 1. D10.4-86(2000) - Welding Austenitic Chromium-Nickle Stainless Steel Piping and Tubing.
- D. ASTM International (ASTM):
 1. A269/A269M-15 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 2. A312/A312M-15b - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 3. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 4. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 5. A1011/A1011M-14 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 6. B30-14a - Copper Alloys in Ingot Form.
 7. B75/B75M-11 - Seamless Copper Tube.
 8. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 9. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 10. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

11. B824-14 - General Requirements for Copper Alloy Castings.
12. C1036-11e1 - Flat Glass.
13. C1048-12e1 - Heat-Strengthened and Fully Tempered Flat Glass.
14. D635-14 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
15. F446-85(2009) - Grab Bars and Accessories Installed in the Bathing Area.

E. Federal Specifications (Fed. Spec.):

1. A-A-3002 - Mirror, Glass.
2. FF-S-107C(2) - Screws, Tapping and Drive.
3. WW-P-541/8B(1) - Plumbing Fixtures (Accessories, Land Use).

F. National Architectural Metal Manufacturers (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

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. 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.

E. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer with project experience list.

F. 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, 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 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum: ASTM B221M (ASTM B221), Alloy 6063-T5 and Alloy 6463-T5.
- B. Stainless Steel:
 - 1. Plate Or Sheet: ASTM A666, Type 304, 0.8 mm (0.031 inch) thick unless otherwise specified.
 - 2. Tubing: ASTM A269/A269M, Grade TP 304, seamless or welded.
 - 3. Pipe: ASTM A312/A312M; Grade TP 304.
- C. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.
- D. Chrome Plating (Service Condition Number SC 2): ASTM B456.
- E. Brass Castings: ASTM B30.
- F. Copper:
 - 1. Tubing: ASTM B75/B75M.
 - 2. Castings: ASTM B824.
- G. Glass:
 - 1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.

2.3 GRAB BARS

- A. Fed. Spec. WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and complying with ASTM F446.
- B. Fabricate from stainless steel, use one type throughout project:
 - 1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.
- C. Mounting:
 - 1. Swing Up Grab Bars: Exposed type.
 - 2. Other Types and Locations: Concealed type.

D. Bars:

1. Fabricate to 38 mm (1-1/2 inch) outside diameter.
 - a. Stainless steel, minimum 1.2 mm (0.05 inch) thick.
2. Fabricate in one continuous piece with ends turned toward walls.
 - a. Swing up grab bars and grab bars continuous around three sides of showers may be fabricated in two sections, with concealed slip joint between.
3. Continuously weld intermediate support to grab bar.
4. Swing Up Bars: Manually operated; designed to prevent bar from falling when in raised position.

E. Flange for Concealed Mounting:

1. Minimum 2.65 mm (0.1 inch) thick, maximum 79 mm (3-1/8 inch) diameter by 13 mm (1/2 inch) deep, with minimum three set screws for securing flange to back plate.
2. Insert grab bar through center of flange and continuously weld perimeter of grab bar flush to back side of flange.
3. In lieu of providing flange for concealed mounting, and back plate as specified, grab bar may be welded to back plate covered with flange.

F. Flange for Exposed Mounting:

1. Minimum 5 mm (3/16 inch) thick, maximum 79 mm (3-1/8 inch) diameter.
2. Insert grab bar through flange and continuously weld perimeter of grab bar flush to backside of flange.

G. Back Plates:

1. Minimum 2.65 mm (0.1046 inch) thick metal.
2. Fabricate in one piece, maximum 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.
3. Provide spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on partitions.

2.4 CLOTHES HOOKS, ROBE OR COAT

- A. Fabricate hook units from chromium plated brass with satin finish, or stainless steel, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to thickness of metal, or 3 mm (1/8 inch) minimum radius.

- B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to wall flange, provided with concealed fastenings.

2.5 METAL FRAMED MIRRORS

- A. Fed. Spec. A-A-3002 metal frame; stainless steel.
- B. Mirror Glass:
 - 1. Minimum 6 mm (1/4 inch) thick.
 - 2. Set mirror in a protective vinyl glazing tape.
- C. Frames:
 - 1. Channel or angle shaped section with face of frame minimum 9 mm (3/8 inch) wide. Fabricate with square corners.
 - 2. Metal Thickness 0.9 mm (0.035 inch).
 - 3. Filler:
 - a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers contoured to conceal void between back of mirror and wall surface.
 - b. Fabricate fillers from same material and finish as mirror frame.
- D. Back Plate:
 - 1. Fabricate backplate for concealed wall hanging from zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame.
 - 2. Provide set screw type theft resistant concealed fastening system for mounting mirrors.
- E. Mounting Bracket:
 - 1. Designed to support mirror tight to wall.
 - 2. Designed to retain mirror with concealed set screw fastenings.

2.6 MEDICINE CABINETS

- A. Basis-of-Design: Omnimed Small Patient E-Lock Security Wall Cabinet, 1 Adjustable Shelf, 7-1/2" wide by 4" deep by 10-1/2" tall.
- B. Hinged Door:
 - 1. Swing door.
 - 2. Punch pad access, battery operated.

2.7 SOAP DISHES

- A. Fed. Spec. WW-P-541/8B, Type VI, Holder.
- B. Soap, Recessed:
 - 1. One piece seamless shell and flange with provisions for concealed fasteners.
 - 2. Fabricate from 0.8 mm (0.031 inch) thick stainless steel.

3. Form surface of soap tray with raised ridges or patterned dimples to provide gripping surface for soap bar, or provide flush soap tray with a retaining lip. Plastic soap trays or tray inserts are not acceptable.

2.8 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.

2.9 STAINLESS STEEL SHELVES (TYPES 45)

- A. Fabricate shelves and brackets to design shown of 1.2 mm (0.05 inch) thick stainless steel.
- B. Round and finish smooth projecting corners of shelves and edge corners of brackets. Drill brackets for 6 mm (1/4 inch) anchor bolts.
- C. Screw or weld brackets to shelves.

2.10 SHOWER CURTAIN AND TRACK

- A. Basis-of-Design: InPro
 1. All component and material selections: See Specification 09 06 00 SCHEDULE OF FINISHES.
- B. Curtain Types:
 1. Fabric Shower Curtains
 2. Privacy Curtains
 3. Curtain Mesh Panels
- C. Accessories and Components
 1. Curtain Track
 2. Privacy Curtain End Caps
 3. Curtain Carriers

4. Privacy Curtain Tie Backs

2.11 PAPER TOWEL DISPENSERS (OWNER PROVIDED, CONTRATOR INSTALLED)

2.12 MANUAL SOAP DISPENSERS (OWNER PROVIDED, CONTRATOR INSTALLED)

2.13 TOILET PAPER DISPENSERS (OWNER PROVIDED, CONTRATOR INSTALLED)

2.14 SANITARY NAPKIN DISPOSALS (OWNER PROVIDED, CONTRATOR INSTALLED)

2.15 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.

2.16 FINISH

- A. Steel Paint Finish:
 - 1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
 - a. One coat primer.
 - b. One coat thermosetting topcoat.
 - c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
 - d. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.
- C. Aluminum Anodized Finish: NAAMM AMP 500.
 - 1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
 - 2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.
- D. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.17 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.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install grab bars according to ASTM F446.
- C. Set work accurately, in alignment and where indicated, parallel or perpendicular as required to line and plane of surface. Install accessories plumb, level, free of rack and twist.

- D. Toggle bolt to steel anchorage plates in frame partitions and hollow 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.
- 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 - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

SECTION 10 44 13

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

Field Painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Testing and Materials (ASTM):
D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic
Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

- A. Semi-recessed type with flat trim and rolled edges of size and design shown.
 - 1. Recessed handles.
 - 2. Vertical black lettering.
 - 3. Tempered vision glass panel.
 - 4. Cabinet and hardware shall not protrude from the adjacent wall surface more than 4 inches.

2.2 FABRICATION

- A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.
- B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.
 - 1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
 - 2. Design doors to open 180 degrees.
 - 3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

- A. Finish interior of cabinet body with baked-on semigloss white enamel.
- B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

- A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.
- B. Install cabinet so that bottom of cabinet is 914 mm (36 inches) above finished floor.

- - - E N D - - -

SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section includes motorized window shades. Provide window shades complete, including brackets, fittings and hardware.

1.2 RELATED WORK:

- A. Color of shade cloth: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualification: Submit evidence that the manufacture has a minimum of three (3) years' experience in providing item of type specified, and that the blinds have performed satisfactorily on similar installations. Submit qualifications.
- B. Submit qualifications for installers who are trained and approved by manufacturer for installation of units provided.
- C. Electrical Requirements:
1. NFPA 70 Article 100.
 2. Listed and labeled in accordance with UL 325.
 3. Marked for intended use, and tested as a system.
 4. Individual testing of components is not acceptable in lieu of system testing.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
1. Shade cloth, each type, 610 mm (24 inch) square, including cord and ring, showing color, finish and texture.
- C. Manufacturer's literature and data; showing details of construction and hardware for:
1. Cloth and window shades
- D. Shop Drawings: Provide fabrication and installation details for cloth shades, including shade cloth materials, their orientation to rollers, and their seam and batten locations.
1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- E. Fire Testing: Submit report of flame spread and smoke developed during product material tests by independent testing laboratory.

F. Manufacturer's warranty.

1.5 WARRANTY:

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

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
AA-V-00200B.....Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories
- C. ASTM International (ASTM):
A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi
- D. National Electric Manufacturer's Association (NEMA):
ICS 6-93(R2006).....Industrial Control and Systems Closures
- E. National Fire Protection Association (NFPA):
70-14.....National Electrical Code (NEC)
701-15.....Fire Tests for Flame Propagation of Textiles and Films
- F. Underwriters Laboratories Inc. (UL):
325-06(R2013).....Door, Drapery, Gate, Louver, and Window Operators and Systems

PART 2 - PRODUCTS

2.1 CLOTH SHADES:

- A. Light-Filtering Shade Cloth: Woven fabric, stain and fade resistant.
 - 1. Basis of Design: see SCHEDULE OF FINISHES
 - 2. Weave: plain weave
 - 3. Thickness: .036 in.

4. Weight: 627 grams per square meter (18.5 ounces per square yard).
5. Openness Factor: 1 percent.
6. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Submit report for testing of shade cloth materials identical to products provided.
7. Drive-End Location: Opposite of perpendicular wall (ie not at the corner of intersecting walls)
8. Shade Cloth Anti-Microbial Characteristics: 'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC9677, and ATCC9645.
9. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated on construction documents, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring for motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 - a. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.
 - b. Electric Motor: Manufacturer's standard tubular, enclosed in roller. Couple rollers according to motor size and location that best suits the shade location.
 - 1) Electrical Characteristics: 120V AC or 24V DC power supply
 - c. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for flush mounting. Provide the following for control activation of shades:
 - 1) Wall mounted controls: switches with hand held remote that are able to electronically set and reconfigure shade open and close limits, shade preset positions, system groups and system subgroups at the control without rewiring and without access to the Electronic Drive Unit.
 - 2) Provide switches that are adjustable and interlocked with motor controls and set to automatically stop the shade at fully raised and fully lowered positions.
 - 3) Operating Function: Stop and hold shade at any position
 - 4) Provide the following options: Group switching with integrated switch control; single face plate for multiple switch cut-outs. Backup gear and crank operator for manual operation

during power failures with detachable handle, length required to make operation convenient from floor level.

- d. Aluminum housing: Provide six-sided aluminum housings for all groups of rollers. Notify Architect of potential housing conflicts with adjacent construction.

2.2 MATERIALS:

- A. Stainless Steel: ASTM A240/A240M.
- B. Extruded Aluminum: ASTM B221M (B221).
- C. Cords for Cloth roller shades: #10 stainless steel chain having not less than 80 kg (175 pounds) breaking strength.

2.3 FASTENINGS:

- A. Zinc-coated or cadmium plated steel or stainless steel fastenings of length and type recommended by manufacturer. Except as otherwise specified, provide fastenings for installation with various structural materials as follows:

Type of Fastening	Structural Material
Wood screw	Wood
Tap screw	Metal
Case-hardened, self-tapping screw in pre-drilled hole	Solid masonry, concrete
Screw or bolt in expansion shields	Solid masonry, concrete
Toggle bolts	Hollow blocks, gypsum wallboard, plaster

2.4 FABRICATION:

- A. Fabricate cloth shades to fit measurements of finished openings obtained at site.
- B. Cloth Shades: Rolling type, constructed of shade cloth mounted on rollers. Provide shade cloth with plain sides, and with hem at bottom to accommodate weight bar.
 - 1. Provide separate shades for each individual sash within opening. Provide shade length that exceeds height of window by 305 mm (12 inches) measured from head to sill, in addition to material required to make-up hem:

- a. Provide rollers with spindles, nylon bearings, tempered steel springs, and other related accessories required for positive action.
- b. Provide rollers of diameter and wall thicknesses required to accommodate operating mechanisms, weights, and widths of shadebands indicated without deflection.
- c. Provide rollers with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
- d. Secure shade cloth to rollers to prevent wrinkling or folding, and on line parallel to axis of rollers so that shade hangs plumb.
- e. Secure shade cloth with zinc-coated steel or stainless steel machine screws spaced not over 228 mm (9 inches) on centers.
- f. Do not attach shade cloth to rollers with tacks.
- g. Provide hem bar of extruded aluminum for entire width of shade band. Heat seal hem bar on all sides to prevent removal.
- h. Provide eyelets with clear openings large enough to accommodate cords, without cutting into cloth when set.
- i. Provide cords of sufficient length to permit shades to be drawn to bottom of opening with ends looped and held with cord rings. Attach cords to hems through metal eyelets in center of slats in bottom hems.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Measure openings before fabrication. Do not scale construction documents.
- B. Provide roller shades at all exterior windows.
 1. Do not provide at Vestibule 117-54 and Pedestrian Walkway 100-54.
- B. Cloth Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions.
 1. Locate rollers in level position as high as practicable at heads of windows.
 2. Install shades to prevent infiltration of light over rollers.
 3. Where extension brackets are necessary for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.

4. Place brackets and rollers so that shades do not interfere with window and screen hardware.
5. Mount shade to allow clearances for window operation hardware.
6. Electrical Connections: Connect motor-operated shade cloth roller shades to building electrical system.
7. Shade installation methods not specifically described, are subject to approval of Contracting Officer Representative (COR).

3.2 ADJUSTING:

- A. Adjust and shades to operate smoothly, free from binding or malfunction throughout entire operational range.

3.3 CLEANING AND PROTECTION:

- A. Clean shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions that ensure that shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged shades that cannot be repaired, in a manner approved by COR before time of Substantial Completion.

3.4 DEMONSTRATION:

- A. Furnish services of factory-authorized service representative to train maintenance personnel to adjust, operate, and maintain motorized shade operation systems.

- - - E N D - - -

SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies solid wood and wood veneer casework, as detailed on the construction documents, including related components and accessories required to form integral units. Wood casework items shown on the construction documents, but not specified below are to be included as part of the work under this section, and applicable portions of the specification are to apply to these items.

1.2 RELATED WORK:

- A. Sealants: Section 07 92 00, JOINT SEALANTS.
- B. Color of Casework Finish: Section 09 06 00, SCHEDULE OF FINISHES.
- C. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- D. Countertop Construction and Materials and Items Installed in Countertops: Section 12 36 00, COUNTERTOPS.
- E. Plumbing Requirements Related to Casework: Division 22, PLUMBING.
- F. Electrical Lighting and Power Requirements Related to Casework: Division 26, ELECTRICAL.

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. Locks for doors and drawers.
 - 2. Adhesive cements.
 - 3. Casework hardware.
- C. Samples:
 - 1. Wood Face Veneer and/or Hardwood.
- D. Shop Drawings (1/2 full size):
 - 1. Each casework type, showing details of construction, including materials, hardware and accessories.
 - 2. Fastenings and method of installation.
- E. Certification:
 - 1. Manufacturer's qualifications specified.
 - 2. Installer's qualifications specified.

1.4 QUALITY ASSURANCE:

- A. Approval by COR is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's qualifications:
 - 1. Manufacturer is regularly engaged in design and manufacture of modular wood veneer casework, casework components and accessories of scope and type similar to indicated requirements for a period of not less than five (5) years.
 - 2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to indicated requirements.
 - 3. Submit manufacturer's qualifications and list of projects, including owner contact information.
- C. Installer Qualifications:
 - 1. Installer has completed at least three (3) projects in last five (5) years in which these products were installed.
 - 2. Submit installer qualifications.

1.5 WARRANTY:

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

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. ASTM International (ASTM):
 - A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - A1008/A1008M-13.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
 - C1036-11E1 (R2012).....Flat Glass
- C. Builders Hardware Manufacturers Association (BHMA):
 - A156.1-13.....Butts and Hinges
 - A156.9-10.....Cabinet Hardware
 - A156.5-14.....Auxiliary Locks and Associated Products

- A156.11-14.....Cabinet Locks
- D. Composite Panel Association (CPA):
 - A208.1-09.....Particleboard
 - A208.2-09.....Medium Density Fiberboard (MDF) for Interior Applications
- E. U.S. Department of Commerce Product Standards (Prod. Std):
 - PS 1-09.....Construction and Industrial Plywood
- F. Hardwood, Plywood and Veneer Association (HPVA):
 - HP-1-09.....Hardwood and Decorative Plywood
- G. Architectural Woodwork Institute (AWI):
 - Architectural Woodwork Standards, Edition 2 Certification Program - 2014
- H. American Society of Mechanical Engineers (ASME):
 - A112.18.1-12.....Plumbing Fixture Fittings
- I. National Electrical Manufacturers Association (NEMA):
 - LD 3-05.....High Pressure Decorative Laminates
- J. Underwriters Laboratories Inc. (UL):
 - 437-08 (R2013).....Key Locks
- K. Scientific Equipment and Furniture Association (SEFA):
 - 2.3-10.....Installation of Scientific Laboratory Furniture and Equipment

PART 2 - PRODUCTS

2.1 PLYWOOD, FACE VENEER:

- A. HPVA HP-1, see Section 09 06 00 SCHEDULE OF FINISHES.

2.2 PLASTIC LAMINATE:

- A. NEMA LD 3, see Section 09 06 00 SCHEDULE OF FINISHES.
- B. Exposed decorative surfaces, both sides of cabinet doors, and for items having plastic laminate finish. General purpose Type HGL.
- C. Cabinet Interiors Including Shelving: Both of following options to comply with NEMA LD 3 as a minimum.
 - 1. Plastic laminate clad plywood or particleboard, MDF (excluding shelves).
- D. Backing sheet on bottom of plastic laminate covered wood tops. Backer Type BKL.
- E. Post Forming Fabrication, Decorative Surface: Post forming Type HGP.

2.3 PARTICLEBOARD:

- A. CPA A208.1, Type 1, Grade M or medium density.

2.4 HARDWARE:

A. Cabinet Locks:

1. Provide where locks are indicated on construction documents.
2. Locked pair of hinged door over 915 mm (36 inches) high:
 - a. ANSI/BHMA A156.5, key one side.
 - b. On active leaf use three (3) point locking device, consisting of two (2) steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
 - c. On inactive leaf provide dummy lever of same design.
 - d. Provide keeper holes for locking device rods and cam.
3. Door and Drawer: ANSI/BHMA A156.11 cam locks. Provide one (1) type for each condition as follows:
 - a. Drawer and Hinged Door up to 915 mm (36 inches) high: E07261.
 - b. Drawer and Hinged Door: Pin-tumbler, cylinder type lock with not less than four (4) pins or a UL 437 rated wafer lock with brass working parts and case.
 - c. Sliding Door: E07161.
4. Key locks differently for each type casework and master key for each service.
 - a. Key drug locker inner door different from outer door.
 - b. Furnish two (2) keys per lock.
 - c. Furnish six (6) master keys per service or Nursing Unit.
5. Marking of Locks and Keys:
 - a. Name of manufacturer, or trademark which can readily be identified legibly marked on each lock and key change number marked on exposed face of lock.
 - b. Key change numbers stamped on keys.
 - c. Key change numbers to provide sufficient information for manufacturer to replace key.

B. Hinged Doors:

1. Provide doors 915 mm (36 inches) and more in height with three (3) hinges and doors less than 915 mm (36 inches) in height is to have two (2) hinges. Each door is to close against two (2) rubber bumpers.
2. Concealed Hinges: BHMA A156.9, Type B01602, 170 degrees of opening, self-closing.

3. Fasteners: Provide full thread wood screws to fasten hinge leaves to door and cabinet frame. Finish screws to match finish of hinges.

C. Door Catches:

1. Friction or Magnetic type, fabricated with metal housing.
2. Provide one (1) catch for cabinet doors 1220 mm (48 inches) high and under, and two (2) for doors over 1220 mm (48 inches) high.

D. Drawer and Door Pulls:

1. Basis of Design: Merillat Classic Satin Nickel Traditional Pull (HP118). Drawer and door pulls to be of a design that can be operated with a force of 22.2 N (5 pounds) or less, with one (1) hand and not require tight grasping, pinching or twisting of the wrist.

E. Drawer Slides:

1. Full extension steel slides with nylon ball-bearing rollers.
2. Slides to have positive stop.
3. Equip drawers with rubber bumpers.

F. Sliding Doors:

1. Each door to be supported by two ball bearing bronze or nylon rollers, or sheaves riding on a stainless steel track at top or bottom, and to be restrained by a nylon or stainless steel guide at the opposite end.
2. Plastic guides are not acceptable.
3. Each door to have rubber silencers set near top and bottom of each jamb.

G. Shelf Standards (Except For Fixed Shelves):

1. Bright zinc-plated steel for recessed mounting with screws, 16 mm (5/8 inch) wide by 5 mm (3/16 inch) high providing 13 mm (1/2 inch) adjustment, complete with shelf supports.

H. Castors:

1. Locking type rated for 79 kg (175 lbs.) each.

2.5 MANUFACTURED PRODUCTS:

- A. When two (2) or more units are required, use products of one (1) manufacturer.
- B. Manufacturer of casework assemblies is to assume complete responsibility for the final assembled unit.
- C. Provide products of a single manufacturer for parts which are alike.

2.6 FABRICATION:

- A. Casework to be of the flush overlay design and, except as otherwise specified, be of Premium Grade construction and of component thickness in conformance with AWI Quality Standards.
- B. Fabricate casework of hardwood and factory finished wood veneer as follows:
 - 1. Where shown (doors and drawers); all semi-concealed surfaces to be plastic laminated.
- C. Support Members for Tops of Tables and Countertops:
 - 1. Construct as detailed on construction documents.
 - 2. Provide miscellaneous steel members and anchor as shown on construction drawings.

2.7 PRODUCTS OF OTHER COMPONENTS DIRECTLY RELATED TO CASEWORK:

- A. Refer to Section 09 65 13, RESILIENT BASE AND ACCESSORIES for work related to rubber base adhered to casework systems.
- B. Refer to Section 12 36 11, COUNTERTOPS for work related to plastic laminate, acid-resistant plastic laminate, metal, molded resin, and methyl methacrylic polymer countertops and/or shelving used in conjunction with casework systems.
- C. Refer to Division 22, PLUMBING for the following work related to casework systems:
 - 1. Sinks, faucets and other plumbing service fixtures, venting, and piping systems.
 - 2. Compressed air, gas, vacuum and piping systems.
- D. Refer to Division 26, ELECTRICAL for the following work related to casework systems:
 - 1. Connections and wiring devices.
 - 2. Connections and lighting fixtures except when factory installed by the manufacturer.

PART 3 - EXECUTION

3.1 COORDINATION:

- A. Begin only after work of other trades is complete, including wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected and area free of trash and debris.
- B. Verify location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.

- C. Verify reinforcement of walls and partitions for support and anchorage of casework.
- D. Coordinate with other Divisions and Sections of the specification for work related to installation of casework systems to avoid interference and completion of service connections.

3.2 INSTALLATION:

- A. Install casework in accordance with manufacturer's written instructions and per SEFA 2.3 recommendations.
 - 1. Install in available space; arranged for safe and convenient operation and maintenance.
 - 2. Align cabinets for flush joints except where shown otherwise.
 - 3. Install with bottom of wall cabinets in alignment and tops of base cabinets aligned level, plumb, true, and straight to a tolerance of 3.2 mm in 2438 mm (1/8 inch in 96 inches).
 - 4. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.
- B. Support Rails:
 - 1. Install true to horizontal at heights shown on construction documents; maximum tolerance for uneven floors is plus or minus 13 mm (1/2 inch).
 - 2. Shim as necessary to accommodate variations in wall surface not exceeding 5 mm (3/16 inch) at fastener.
- C. Wall Strips:
 - 1. Install true to vertical and spaced as shown on construction documents.
 - 2. Align slots to assure that hanging units will be level.
- D. Plug Buttons:
 - 1. Install plug buttons in predrilled or prepunched perforations not used.
 - 2. Use chromium plate plug buttons or buttons finish to match adjacent surfaces.
- E. Seal junctures of casework systems with mildew-resistant silicone sealants as specified in Section 07 92 00, JOINT SEALANTS.

3.3. CLOSURES AND FILLER PLATES:

- A. Close openings larger than 6 mm (1/4 inch) wide between cabinets and adjacent walls with flat, steel closure strips, scribed to required contours, or machined formed steel fillers with returns, and secured

with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.

- B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.
- C. Secure filler plates to casework top members, unless shown otherwise on construction documents.
- D. Secure filler plates more than 152 mm (6 inches) in width top edge to a continuous 25 x 25 mm (1 x 1 inch) 0.889 mm (1/16 inch) thick steel formed steel angle with screws.
- E. Anchor angle to ceiling with toggle bolts.
- F. Install closure strips at exposed ends of pipe space and offset opening into concealed space.
- G. Finish closure strips and fillers with same finishes as cabinets.

3.4 FASTENINGS AND ANCHORAGE:

- A. Do not anchor to wood ground strips.
- B. Provide hat shape metal spacers where fasteners span gaps or spaces.
- C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.
- D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.
- E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to wood blocking for concealed fasteners.
- F. Use not less than No. 12 or 14 wood screws with not less than 38 mm (1-1/2 inch) penetration into wood blocking.
- G. Space fastening devices 305 mm (12 inches) on center with minimum of three (3) fasteners in 915 or 1220 mm (3 or 4 foot) unit width.
- H. Anchor floor mounted cabinets with a minimum of four (4) bolts through corner gussets. Anchor bolts may be combined with or separate from leveling device.
- I. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
- J. Where units abut end to end, anchor together at top and bottom of sides at front and back. Where units are back to back, anchor backs together at corners with hex bolts placed inconspicuously inside casework.

- K. Where type, size, or spacing of fastenings is not shown on construction documents or specified, show on shop drawings proposed fastenings and method of installation.

3.5 ADJUSTMENTS:

- A. Adjust equipment to insure proper alignment and operation.
- B. Replace or repair damaged or improperly operating materials, components or equipment.

3.6 CLEANING:

- A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter.
- B. Remove from job site trash, debris and packing materials.
- C. Leave installed areas clean of dust and debris.

3.7 INSTRUCTIONS:

- A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.
- B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.
- C. Commencing at least seven (7) days prior to opening of facility, provide one (1) four (4) hour day of on-site orientation and technical instruction on use and cleaning procedures application to products and systems specified herein.

- - - E N D - - -

VAMC SIOUX FALLS
CONSTRUCT CLC COTTAGE - HOSPICE

VA PROJECT NO. 438-420
SCHEMMER NO. 06054.034

JUNE 2021

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. Color and patterns of plastic laminate: SECTION 09 06 00, SCHEDULE FOR FINISHES.
- B. DIVISION 22, PLUMBING.

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):
 - 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

- A. Plastic Laminate: NEMA LD 3.
 - 1. Concealed backing sheet Type BKL.
 - 2. Decorative surfaces:
 - a. Flat components: Type GP-HGL.
 - b. Post forming: Type PF-HGP.
 - 3. Chemical Resistant Surfaces
 - a. Flat components: Type GP-HGL.
 - b. Post forming: Type PF-HGP.
 - c. Resistance to reagents:
 - 1) Test with five 0.25 mil drops remaining on surface for 16
hours followed by washing off with tap water, then cleaned
with liquid soap and water, dried with soft cotton cloth and
then cleaned with naphtha.

2) No change in color, surface texture, and original protectability remaining from test results of following reagents:

98% Acetic Acid	Butyl Alcohol	Acetone
90% Formic Acid--	Benzine	Chloroform
28% Ammonium Hydroxide	Xylene	Carbon Tetrachloride
Zinc Chloride (Sat.)	Toluene	Cresol
Sodium Carbonate (Sat.)	Gasoline	Ether
Calcium Hypochlorite (Sat.)	Kerosene	Cottonseed Oil
Sodium Chloride (Sat.)	Mineral Oil	40% Formaldehyde
Methyl Alcohol	Ethyl Acetate	Trichlorethylene
Ethyl Alcohol	Amyl Acetate	Monochlorobenzine

3) Superficial effects only: Slight color change, spot, or residue only with original protectability remaining from test results of following reagents:

77% Sulfuric Acid	37% Hydrochloric Acid	85% Phenol
33% Sulfuric Acid	20% Nitric Acid	Furfural
85% Phosphoric Acid	30% Nitric Acid	Dioxane

4) Minimum height of impact resistance: 300 mm (12 inches).

B. Molded Resin:

1. Non-glare epoxy resin or furan resin compounded and cured for minimum physical properties specified:

Flexural strength	70 MPa (10,000 psi)	ASTM D790
Rockwell hardness	105	ASTM D785
Water absorption, 14 hours (weight)	.01%	ASTM D570

2. Material of uniform mixture throughout.

C. Particleboard: CPA A208.1, Grade 2-M-2.

D. 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.

E. 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.

F. Solid Polymer Material:

- 1. Filled Methyl Methacrylic Polymer.
- 2. Performance properties required:

Property	Result	Test
Elongation	0.3% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785
Gloss (60° Gordon)	5-20	NEMA LD3.1
Color stability	No change	NEMA LD3 except 200 hour
Abrasion resistance	No loss of pattern Max wear depth 0.0762 mm (0.003 in) - 10000 cycles	NEMA LD3
Water absorption weight (5 max)	24 hours 0.9	ASTM D-570
Izod impact	14 N·m/m (0.25 ft-lb/in)	ASTM D256 (Method A)
Impact resistance	No fracture	NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball
Boiling water surface resistance	No visible change	NEMA LD3
High temperature resistance	Slight surface dulling	NEMA LD3

- 3. Cast into sheet form and bowl form.
- 4. Color throughout with subtle veining through thickness.
- 5. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
- 6. Bio-based products will be preferred.

G. Laminar Flow Control Device

1. Smooth bright stainless steel or satin finish, chrome plated metal laminar flow device shall provide non-aeration, clear, coherent laminar flow that will not splash in basin. Device shall also have a flow control restrictor and have vandal resistant housing.
2. Flow Control Restrictor:
 - a. Capable of restricting flow of 7.5 to 8.5 Lpm (2.0 to 2.2 gpm) for sinks provided in paragraph 2.2D.
 - b. Compensates for pressure fluctuation maintaining flow rate specified above within 10 percent between 175 and 550 kPa (25 and 80 psi).
 - c. Operates by expansion and contraction, eliminates mineral/sediment building up with self clearing action, and is capable of easy manual cleaning.

2.2 SINKS

A. Molded Resin:

1. Cast or molded in one piece with interior corners 25 mm (one inch) minimum radius.
2. Minimum thickness of sides and ends 13 mm (1/2 inch), bottom 16 mm (5/8 inch).
3. Molded resin outlet for drain and standpipe overflow.
4. Provide clamping collar permitting connection to 38 mm (1-1/2 inch) or 50 mm (2 inch) waste outlet and trap, making sealed but not permanent connection.

B. Stainless Steel:

1. ANSI/ASME A112.19.3, Type 304.
2. Self rim for plastic laminate or similar tops with concealed fasteners.
3. Flat rim for welded into stainless steel tops.
4. Ledge back or ledge sides with holes to receive required fixtures when mounted on countertop.
5. Apply fire resistant sound deadening material to underside.

D. Sinks of acrylic-modified polyester:

1. Minimum 19 mm (3/4 inch) thick, cast into bowl shape with overflow to drain.
2. Provide for underhung installation to countertop.
3. Provide openings for drain.

4. Solid Surface:

- a. Dupont Corian accessible 820 color to match countertop.

2.3 TRAPS AND FITTINGS

- A. Material as specified in DIVISION 22, PLUMBING.
- B. For Molded Resin Sinks:
 1. Chemical resisting P-traps and fittings for chemical waste service.
 2. Provide traps with cleanout plug easily removable without tools.
- C. For Stainless Steel Sinks:
 1. Either cast or wrought brass or stainless steel P-traps and drain fittings; ASME A112.18.1
 2. Flat strainer, except where cup strainer or overflow standpipe specified.
 - a. Provide cup strainer in cabinet type 1B.
 - b. Provide stainless steel overflow stand pipe to within 38 mm (1-1/2 inches) of sink rim.
 3. Exposed surface chromium plated finish.
- D. Plaster traps:
 1. Cast iron body with porcelain enamel exterior finish.
 2. 50 mm (2 inch) female threaded side inlet and outlet.
 3. Removable galvanized cage having integral baffles and replaceable brass screens.
 4. Removable gasketed cover.
 5. Minimum overall dimensions: 350 x 350 x 400 mm high (14 x 14 x 16 inches) with 175 mm (7 inch) water seal.
 6. Non-siphoning and easily accessible for cleaning.
- E. Air Gap Fittings: ASME A112.1.2.
- F. Acrylic-modified polyester Sink Traps:
 1. Cast or wrought brass with flat grid strainer, off-set tail piece, adjustable 38 x 32 mm (1-1/2 x 1 1/4-inch) P trap.
 2. Chromium plated finish.

2.4 WATER FAUCETS

- A. ASME A112.18.1.
 1. Cast or forged brass, compression type with replaceable seat and stem assembly or replaceable cartridge.
 2. Indexed lever handles either with or without head.
 3. Gooseneck minimum clearance above countertop of 190 mm (7-1/2 inches), bent 180 degrees for vertical discharge.
 4. Swing spouts elevated to clear handles.
 5. Exposed brass surfaces chromium plated.

- 6. Cast combination hot and cold fixture with one piece body for multiple outlets.
- 7. Adapter type connection which will permit field conversion of swing spouts to fixed or gooseneck grouts or vice versa.
- 8. Pedestals Top for Laboratory or Pharmacy:
 - a. Modern design tapered to a round base, factory assembled and tested.
 - b. Brass shanks, locknuts and washers for attaching to top or curbs.
- B. Laminar flow control device on spouts.
- C. Automatic Controlled Faucets.
 - 1. Infra-red photocell sensor and a solenoid valve to control water flow automatically.
 - 2. Breaking light beam activates water flow.
 - 3. Water stops when user moves away from light beam.
- G. Vanity or Lavatory Faucets in acrylic-modified polyester tops:
 - 1. Extra long center set single lever handle control.
 - 2. Cast or wrought copper alloy, vandal resistant.
 - 3. Stainless steel ball type with replaceable non-metallic seats, stainless steel lined sockets.
 - 4. Handle always returning to the neutral position or cartridge body construction.
 - 5. Provide laminar flow control device.

2.5 FIXTURE IDENTIFICATION

- A. Code fixtures with full view plastic index buttons.
- B. Use following colors and codes:

SERVICE	COLOR	CODE	COLOR OF LETTERS
Cold Water	Dark Green	CW	White
Hot Water	Red	HW	White
Laboratory Air	Orange	AIR	Black
Fuel Gas	Dark Blue	GAS	White
Laboratory Vacuum	Yellow	VAC	Black
Distilled Water	White	DW	Black
Deionized Water	White	DI	Black
Oxygen	Light Green	OXY	White
Hydrogen	Pink	H	Black
Nitrogen	Gray	N	Black
All Other Gases	Light Blue	CHEM.SYM.	Black

2.6 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 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.
- H. Drill or cutout for sinks, and penetrations.
 - 1. Accurately cut for size of penetration.
 - 2. Cutout for VL 81 photographic enlarger cabinet.
 - a. Finish cutout to fit flush with vertical side of cabinet, allowing adjustable shelf to fit into cutout space of cabinet at counter top level. Finish cutout surface as an exposed edge.
 - b. Provide braces under enlarger space to support not less than 45 kg (100 pounds) centered on opening side along backsplash.
- I. Plastic Laminate Countertops:
 - 1. Fabricate plastic laminate on five-ply plywood or particleboard core 19 mm (3/4 inch) thick with plastic laminate backing sheet.
 - 2. Front edge over cabinets not less than 38 mm (1-1/2 inches) thick except where plastic "T" insert is used, not less than 19 mm (3/4 inch) thick.
 - 3. Exposed Surface and edges of decorative laminated plastic or laboratory chemical resistant surface.
 - a. Use chemical resistant surface on tops 6A, 6B, and 6C.
 - b. Use decorative surface tops when noted plastic laminate, for tops 10A, 10B and 10C.

J. Molded Resin Tops:

1. Molded resin with drip groove cut on underside of overhanging edge.
2. Finish thickness of top minimum 25 mm (1 inch).
3. Joints: Epoxy Type.
4. Secure reagent shelves to counter tops with fasteners from underside and seal seam.

K. Acrylic-modified polyester Tops:

1. Fabricate countertop of acrylic-modified polyester cast sheet, 19 mm (3/4 inch) thick.
2. Fabricate back splash and end splash to height shown.
3. Fabricate skirt to depth shown.
4. Fabricate with marine edge where sinks occur.
5. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
6. Join pieces with adhesive sealant.
7. Cut out countertop for lavatories, plumbing trim.
8. Provide concealed fasteners and epoxy cement for anchorage of sinks to countertop.

L. Counter Tops for Interchangeable Furniture: Counter tops, unless otherwise shown, are to be capable of vertical adjustment of 150 mm (6 inches). Fabricate tops, except CRS, in increments of units over which they fit with maximum length not to exceed 1950 mm (78 inches). Top section shall cover as many cabinet units as possible. Horizontal joints in counter tops at service strip and across depth of counter are to be watertight when in place but of a type that can be easily separated and reset when counter top is moved up or down. Fabricate CRS tops in maximum lengths practicable, with field joints welded and ground smooth to match adjacent surfaces. Securely fasten to supporting rails with heavy metal fastening devices, or with screws, through pierced slots in such rails. Fabricate vertical splash back and reagent shelf in maximum length practicable of same material as working surface, except finish thickness shall be 19 mm (3/4 inch).

M. Countertop products shall comply with following standards for biobased materials:

Material Type	Percent by Weight
Composite Panel	89 percent biobased material
Hardwood	89 percent biobased material
Particleboard	89 percent biobased material
Plywood	89 percent biobased material

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

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.
- D. Sinks
 - 1. Install stainless steel sink in plastic laminate tops with epoxy compound to form watertight seal under shelf rim.
 - a. In laboratory and pharmacy fit stainless steel sink with overflow standpipe.
 - b. Install faucets and fittings on sink ledges with watertight seals where shown.

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 acrylic-modified polyester 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.
- E. Faucets, Fixtures, and Outlets:
 1. Seal opening between fixture and top.
 2. Secure to top with manufacturers standard fittings.

3.2 PROTECTION AND CLEANING

- A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
- B. Clean at completion of work.

- - - E N D - - -