TTVARCHITECTS, INC.

SPECIALTY TREATMENT EXPANSION PROJECT
JAMES A. HALEY VETERAN'S HOSPITAL
TAMPA, FLORIDA

VOLUME 1
Specifications

for

DEPARTMENT OF VETERANS AFFAIRS
VA Project Number 673-CSI-100

INTERIOR DESIGN AND MEDICAL EQUIPMENT
REVISIONS SET
April 18, 2012

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MEDICAL EQUIPMENT

REFER TO OWNER PROVIDED REFERENCE MANUFACTURER'S MEDICAL EQUIPMENT DRAWINGS & INFORMATION INCLUDED HEREIN.

-G.C. TO COORDINATE MANUFACTURER'S EQUIPMENT REQUIREMENTS & RECOMMENDATIONS W/ ALL DISCIPLINES.

-WHERE THERE IS A CONFLICT BETWEEN THE REFERENCED MANUFACTURER'S DOCUMENTS AND ANY OTHER DISCIPLINES- CONSULT ARCHITECT FOR DIRECTION.

-THE GC IS RESPONSIBLE FOR THE SCOPE OF THE WORK LISTED IN THE CONTRACT DOCUMENTS AND IN REFERENCED MANUFACTURER'S EQUIPMENT DOCUMENTS (EVEN IF THEY ARE IN CONFLICT.)

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SECTION 01 00 00
GENERAL REQUIREMENTS

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1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and other items as indicated herein. The Contractor shall furnish all necessary equipment, labor, materials, temporary equipment and items, tools, specialty services, supervision, and perform work for **NRM Project No. 673-CSI-100,** "SPECIALTY TREATMENT EXPANSION PROJECT" at the James A. Haley Veterans Hospital located in Tampa, Florida as required by drawings and specifications.

B. [redacted] All bids will take into consideration of existing site conditions; it is the responsibility of the contractor to review the entire job site footprint and existing site conditions prior to bid submission. All proposals shall include a detailed cost breakdown (materials, labor, and equipment) by trade, specification division and section; lump sum costs are not acceptable.

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

D. Before placement and installation of work subject to tests by testing laboratory or other parties retained by Department of Veterans Affairs, the Contractor shall notify the COTR and Contracting Officer (CO) in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than seven (7) calendar days, unless otherwise designated by the COTR and Contracting Officer.

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

F. 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.

G. **Training:**

1. Beginning July 31, 2005, all supervisory type personnel and employees of general contractor and subcontractors shall have the 30-hour OSHA certified Construction Safety course and other relevant competency training, as determined by VA CP with input from the ICRA team.
2. Beginning July 31, 2005, all non-supervisory type personnel and employees of general contractor and subcontractors shall have the 10-hour OSHA certified Construction Safety Course and other relevant competency training, as determined by VA CP with input from the ICRA team.
3. Submit copies of certificates and training records for all such personnel and employees that may be and/or will be on the work site(s) to the COTR and Contracting Officer for approval before the start of any work on-site.

H. **Related Work:** This specification section applies to ALL Divisions (0 through 34) of work under ALL other specification sections. A partial list of Codes and Standards adopted by the Department of Veterans Affairs is attached in Appendix B.

I. **Normal Operation / Construction Hours:** Construction operations at the James A. Haley VA Hospital are 7:30 AM to 4:30 PM, Monday through Friday, with the exception of Federal Holidays. Requests to work beyond normal work hours shall be submitted in writing to the Resident Engineer / COTR for approval and will include a description of work to be performed. Approval is subject to availability of the Resident Engineer / COTR, type of work to be performed, and the specific hours requested. Contractors are reminded that patients are generally asleep after 10:00 PM. Approval to work beyond this time will also include an evaluation of the anticipated noise level generated by the contractor. Under no circumstances will the contractor proceed without express, written approval of the Resident Engineer / COTR.

1.2 STATEMENT OF BID ITEM(S)

A. **ITEM I, GENERAL CONSTRUCTION:** Provide all necessary equipment, labor, materials, specialty services, supervision, and tools to complete **NRM Project No. 673-CSI-100, "Specialty Treatment Expansion Project**. Work

includes architectural, asbestos abatement, mechanical, electrical, plumbing and interior designs, and certain other items of work required by the drawings and specifications. All work is to be completed in **600 calendar days including weekend work and night shift work.**

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. Additional sets of drawings and specifications may be made by the Contractor, at Contractor's expense, from PDF document copies that can be requested from the COTR's electronic files.

B. Additional sets of drawings and specifications may be made by the Contractor, at Contractor's expense, from electronic or reproducible hard copy prints furnished by the ISSUING OFFICE. Such media or prints shall be returned to the ISSUING OFFICE immediately after printing is completed.

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.
3. The General Contractor shall furnish to the COTR and Contracting Officer lists of employees that will be or may be on the construction site(s). The List shall be on Company letter head that provides all of the company contact information, shall provide the project number and title, locations of work, names of the employees, their titles, their job types, and personal contact numbers (i.e. cell phone). All sub-contractors, vendors and suppliers for the project shall furnish the same listing on their individual company letter heads to the GC whom will provide the lists to the COTR and Contracting Officer. These lists shall be updated as necessary during the entire duration of the project. These lists may be used to provide a check list record of personnel on-site each day to be provided with the contractors Daily Log reports. These lists may be used to provide a check list record of personnel on-site each day to be provided to the VA Police Department and their Dispatch Office where normal sign in and sign out occurs.

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 provide a request for approval 14 calendar days prior to the requested date, to the Contracting Officer and COTR, so that security, escort and other appropriate arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown or access closure described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. **Guards:**

1. The General Contractor shall not be required to provide unarmed guards at the project site twenty-four (24) hours a day, seven (7) days a week or after construction hours.
2. Any guard provided shall have communication devices to report events as directed by VA Police.
3. The General Contractor is not required to install equipment for recording guard rounds to ensure systematic checking of the premises.
4. The General Contractor may need to provide a guard as required by the contract drawings and specifications, including specification sections for Asbestos Abatement.

D. **Key Control:**

1. The General Contractor shall provide duplicate keys and lock combinations to the COTR and Contracting Officer 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 lock cylinders with associated parts and instructions to the VA COTR and locksmith for

permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

3. Contractor may be issued keys and/or keycard for construction through the COTR and Contracting Officer.
4. All keys and/or keycard must be turned in at the end of Contract.
5. Any key assigned to the contractor, which is lost or stolen will result in a replacement cost of $100.00 per key and/or keycard either lost or stolen. Any key either lost or stolen shall be reported to the COTR; it is the contractor's responsibility to inform VA Police and give a detailed report about the key loss. The contractor shall take a copy of the official police report and make payment to the Agent Cashier before any additional replacement keys are made. Final payment may be withheld and/or reduced until all keys are returned or accounted for. A copy of the Police Report and receipt of payment shall be provided to the VA COTR.

E. **Document Control:**

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
   a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
   b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

F. **Motor Vehicle Restrictions**
   1. Access shall be restricted to picking up and dropping off materials and supplies.
   2. Separate permits shall be issued for General Contractor and its employees for parking in designated areas only.
   3. There are no Contractor designated general parking areas. General Contractor parking is at the University Mall. The Patient Shuttle Services provided by the VA can be used on a first come, first served basis.

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
   4. Hospital Policy Memorandums:

HPM 138-03.....Safety and Health during Construction Activities
HPM 138-04.....Lockout / Tagout Program
HPM 138-15.....Interim Life Safety Measures (ILSM)
HPM 138-17.....Notification of Fire Alarm Shutdown
HPM 138-23.....Utility Shutdown Procedures
HPM 138-24.....Infection Control during Construction and Renovation

1. **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 COTR and Contracting Officer 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 COTR and Contracting Officer that all individuals have undergone the 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. **Temporary Facilities:** 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 6.1 m (20 feet) exposing overall length, separate by 3.0 m (10 feet).

E. **Temporary Construction Partitions:**

1. Install and maintain temporary construction partitions to provide smoke-tight separations between, construction areas, the areas that are described in phasing requirements, and adjoining areas. Construct partitions of gypsum board (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of steel studs. Extend the partitions through suspended ceilings to floor slab deck

or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.

2. Install one-hour and/or two-hour fire-rated temporary construction partitions as shown on drawings and/or as indicated in the specification sections 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 fire stop 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 COTR and Contracting Officer.

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

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

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

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

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

M. **Existing Fire Protection**: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than four (4) hours in a twenty-four (24) hour period. Request interruptions in accordance with Article 1.6, OPERATIONS AND STORAGE AREAS, and coordinate with COTR and Contracting Officer. 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 COTR and Contracting Officer.

N. **Smoke Detectors:** Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COTR and Contracting Officer. Replace all smoke detection devices in the construction area with heat detection devices for the duration of the project. Prior to final project inspection, smoke detectors shall be reinstalled.

O. **Hot Work (Burn Permit):** Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COTR and Contracting Officer. Obtain permits from facility COTR and Contracting Officer at least **seventy-two (72) hours** in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work. See Appendix C for the proper procedure and forms and Appendix D for the proper safety procedures for hot work.

P. **Fire Hazard Prevention and Safety Inspections:** Inspect entire construction areas daily. Coordinate with, and report findings and corrective actions daily to COTR and Contracting Officer. See HPM 138-03.

Q. **Smoking:** **Smoking is prohibited** in and adjacent to construction areas inside and outside of existing buildings and additions under construction.

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

S. **Construction Operations:** Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

T. **Impaired Areas:** If required, submit documentation to the COTR and Contracting Officer that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

U. **Forms:** Forms for certain Fire Safety items are attached to this specification section.

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 COTR and 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 COTR and 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 COTR and the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

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

D. Working space and space available for storing materials shall be as determined by the COTR and Contracting Officer. The Contractor shall keep ALL work areas, storage areas, staging areas, and access areas and routes clean and neat. The Contractor shall provide sufficient trash containers so there is no debris lying around. The containers shall be emptied at least daily and trash disposed of by the contractor.

E. Workmen are subject to rules of the Medical Center applicable to their conduct. All personal automobiles and contractor vehicles shall be parked off-site, as there is no available parking on-site.

F. Execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.

G. Execute work so as to interfere as little as possible with normal functioning of the 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 COTR and Contracting Officer 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 (2) work days. Provide unobstructed access to the Medical Center areas required to remain in operation.
3. Where access by the Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

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

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

I. **Phasing:** To insure such executions, Contractor shall furnish the COTR and Contracting Officer with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COTR and Contracting Officer **twenty-one (21) calendar days in advance** of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to the Medical Center Director, COTR and Contracting Officer and Contractor.

1. The contractor is to submit his phasing schedule in writing to the Contracting Officer for review and approval no later than **twenty-one (21) calendar days** after issuance of the Notice to Proceed. This includes utility outages and access closures.
2. All work, such as corridor work, which is outside the main construction area, shall be done on evenings or weekends, so as not to disrupt the normal operations.
3. The contractor shall have **all** submittals completed and turned in to the Government for review by the A/E firm no later than **thirty (30) calendar days** from the date of the signed Notice to Proceed. The government will return submittals within **twenty-one (21) calendar days** from acceptance from the contractor. **NO WORK SHALL BE STARTED UNTIL ALL RELATED SUBMITTALS ARE APPROVED.** All materials shall be approved by the Government prior to delivery to the job site and start of work.
4. All renovation activities will take place at a busy Medical Center. The contractor shall not interfere with existing, on-going functions, or normal activity of the hospital. The contractor will provide walk-off mats for dust control, appropriate construction barriers, and keep noise & vibration to a minimum during normal business hours. Contractors shall review Hospital Policy Memorandum (HPM) No. 138-24, "Infection Control During Construction and Renovation" and comply as outlined in this policy. Certain portions of the work will be confined to evenings, and/or weekends, as identified on the drawings.
5. No work shall start until the preconstruction survey and inspection is completed.
6. The Contractor shall provide a detailed asbestos abatement schedule, if required by the project scope.
7. Any utility service, parking lot, roadway, loading dock, and/or Grounds interruptions requests shall be submitted in writing **twenty-one (21) calendar days** in advance of the planned utility interruption/access closure. For approval and coordination, see HPM 138-23 Appendix C.
8. Set up phasing by buildings, wings, floors, or areas in accordance with information received from the Medical Center through the COTR and the Contracting Officer.

J. **Vacated Buildings:** Building(s) will be vacated by Government in accordance with above phasing beginning immediately after date of receipt of Notice to Proceed and turned over to Contractor.

K. **Occupied Buildings:** Building(s) will be occupied during performance of work, but immediate areas of alterations will be vacated.

1. Certain areas of Building(s) will be occupied by Medical Center personnel for various periods. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affair's personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by 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.

L. **Construction Fence:** Before construction operations begin, Contractor shall provide a chain link construction fence, 2.1 m (7 feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 381 mm (15 inches). Bottom of fences shall extend to 25 mm (1 inch) above grade. Remove the fence when directed by the COTR and Contracting Officer.

M. **Buildings and Systems**: When a building is turned over to Contractor, the Contractor shall accept entire responsibility. Therefore:

1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs

or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.

N. **Existing Utilities Services**: Maintain existing utility services for the 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 a main branch or suitable places where shown; or, in absence of such indication, where directed by the COTR and Contracting Officer.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior written approval of the COTR and Contracting Officer. 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. The attached Live Electrical Work notification form must be used. See Appendix C for the proper procedure and forms and Appendix D for the proper safety procedures to be followed.
2. Contractor shall submit a request to interrupt any such services to the COTR and Contracting Officer, in writing, **twenty-one (21) calendar days** in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption. See Appendix C for the proper procedure and forms and Appendix D for the proper safety procedures to be followed.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of the 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 **twenty-one (21) calendar days** prior to the desired time and shall be performed as directed by the COTR and Contracting Officer.
5. In case of a contract construction emergency, service will be interrupted on approval of the COTR and Contracting Officer. Such approval will be confirmed in writing as soon as practical. On the next business day, the contractor's Daily Log report shall explain the circumstances causing the emergency and the corrective actions taken.
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.

O. **Abandoned Lines**: N/A

P. **Roads, Parking Lots, Docks and Grounds**: To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever excavation for new utility lines cross existing roads, at least one lane must be open to traffic at all times.
2. Method and scheduling of required cutting, altering and removal of existing roads, parking lots, walks and entrances must be approved by the COTR and Contracting Officer.
3. Interruptions of these areas must be requested, in writing, at least **twenty-one (21) calendar days** prior to the desired time and shall be performed as directed by the COTR and Contracting Officer.
4. Interruptions will follow the same procedures as outlined in Article 1.6.N.2, Existing Utility Services.

Q. **Coordination of Work**: Coordinate the work for this contract with other construction operations as directed by the COTR and Contracting Officer. This includes the scheduling of traffic and the use of roadways, as specified in Article 1.16, USE OF ROADWAYS, PARKING LOTS, AND GROUNDS.

R. **Coordination of Construction with Medical Center Director:** The activities at a Medical Center shall take precedence over construction activities. The Contractor must cooperate and coordinate with the Medical Center, through the COTR and Contracting Officer, in arranging construction schedule to cause the least possible interference with facility activities on the campus. Construction noise during the events or services shall not disturb the events or service. Trucks and workmen shall not pass through the event or service area during this period:

1. The Contractor is required to discontinue his work sufficiently in advance of Easter Sunday, Mother's Day, Father's Day, Memorial Day, Veteran's Day and/or Federal holidays, to permit him to clean up all areas of operation adjacent to existing event or service areas before these dates.
2. The Medical Center observes the following **Federal Holidays**: New Years Day, Labor Day, Martin Luther King Jr. Day, Columbus Day, Presidents Day, Veterans Day, Memorial Day, Thanksgiving, Independence Day, and Christmas Day.
3. Clean-up shall include the removal of all equipment, tools, materials and debris and leaving the areas in a clean, neat condition.

S. **Sign-In / Sign-Out Procedures:**

1. All contractor employees are required to sign in and out at VA Police dispatch located in Building #1, First floor, A-Wing, Room 1A-147, near the Emergency Room Entrance, unless otherwise directed by the COTR. A valid state driver's license or state identification card is mandatory for all employees to have access to this facility. All employees are required to wear the assigned VA badges at all times.
2. If after-hour key service is needed, contact the Hospital Police Dispatch Office at extension 7554. All after hours work shall be coordinated through the Contracting Officer in writing **14 calendar days prior to approval.**

T. **Reports:**

1. **Daily Logs:** In conjunction with the contractor's daily report, Contractor shall furnish a daily report for each day from the date of Notice to Proceed until Final Acceptance, including those days that no work is performed. The report shall have attached there to a

copy of inspections conducted by the VA, a list of all employees on site that day, however, this does not relieve the Contractor of the responsibility to conduct and report inspections. Daily reports shall be submitted on Form VAF 10-6131, "Daily Log" **to the COTR by 9:00 AM the following duty day.**

2. **Payrolls:** The Contractor shall submit two (2) copies of certified payrolls required by VAAR 852.236-85 - Supplementary Labor Standard Provision. Certified payrolls shall be submitted to the Contracting Officer no later than Wednesday for the previous week.
3. **Payment Requests:** Monthly payment requests from the contractor will not be processed unless all paperwork is current, including daily reports, asbestos reports, updated process schedules and certified payrolls for the prime and all subs.
4. **Requests for Information and/or Clarification:** All RFI's and RFC's shall be submitted to the Contracting Officer to ensure timely response. The Government will answer RFI's and RFC's within **twenty-one (21) calendar days** from acceptance from the contractor.
5. **Submittal Log:** The contractor shall utilize the specifications and drawings to prepare and provide a submittal log. The Submittal Log shall list all submittals by specification section, paragraph and drawing numbers from the beginning to the end of the documents. The Submittal Log shall be provided to the COTR and Contracting Officer within **ten (10) calendar days** after receipt of Notice To Proceed. The Government may require additional submittals at its discretion at no additional cost. All submittals shall be approved, by the Contracting Officer prior to beginning related work.

U. **Material Safety Data Sheets (MSDS's):** Contractor shall provide five (3) **GREEN** Loose-leaf binders, permanently labeled "MSDS for Project – SPECIALTY TREATMENT EXPANSION PROJECT" with copies of each Material Safety Data Sheets for each and every product, chemical, and other required materials to be used on this project.

1. All instructions for use shall be compiled with.
2. Products will not be used until MSDS's are submitted to the COTR. These shall be provided for any material no later than the day before those materials arrive on VA property.

3. The contractor shall maintain a current binder on the job site at all times, readily available for viewing by the COTR, Contracting Officer, or Safety Officer.
4. At no time shall the Contractor have, or permit the sub-contractors to have, materials on VA property/station without MSDS.

V. **Fire Retardant Materials**: All materials used on this project, including temporary barriers, plywood, poly, and other required materials shall be fire retardant. All poly shall be 6 mil. minimum. The semi-permanent construction barriers shall be smoke tight.

W. **Smoke Free Facility**: The James A. Haley VA Hospital is a **SMOKE FREE** facility. There is **NO SMOKING** allowed in any interior or exterior spaces, including all Mechanical Spaces and roofs. Smoking is only permitted in designated exterior smoking areas.

1.7 ALTERATIONS

A. **Survey**: Before any work is started, the Contractor shall make a thorough survey with the COTR and Contracting Officer of buildings, grounds, areas of buildings and grounds in which alterations occur, and areas which are anticipated routes of access. The contractor shall furnish a report, signed by all three, which lists any deficiencies noted at that time. This report shall be approved by the VA prior to the start of any work. The inspection shall include a 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(s) and grounds.
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(s).
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, COTR and Contracting Officer.

B. **Relocated Items**: Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in

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

C. **Re-Survey**: **Thirty (30) calendar days** before expected partial or final inspection date, the Contractor, COTR and Contracting Officer 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 roofs, 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.
4. Once the contractor is notified by the VA of problems or damage to VA property, the contractor shall take immediate corrective action to protect and restore said property. During normal duty hours, corrective action shall be initiated within **two (2) hours**. After normal duty hours, corrective action shall be initiated within **four**

(4) hours. The Daily Log for that day shall explain the problem(s) and corrective action(s) taken.

5. Dampen debris to keep down dust and provide temporary construction, dust-proof, asbestos containment, smoke rated, and/or fire rated barriers where specified, where indicated on the drawings, and as directed by the COTR. Access doors in barriers shall be hinged and secured with locks. Walk-off mats shall be provided at all access doors.
6. Block off all ducts and diffusers to prevent circulation of dust into occupied areas during construction. Provide Negative Air Machines as specified, to maintain negative pressure within the construction area(s).
7. The contractor **shall not** allow trash and debris to accumulate on the job site. As a minimum, trash and debris shall be removed once daily, with no flammable materials or trash left on the construction site overnight. All debris shall be removed from the job site in a closed container and disposed of in a proper manner.

1.8 INFECTION PREVENTION MEASURES

A. Contractor's shall review Hospital Policy Memorandum (HPM) No. 138-24 "Infection Control During Construction and Renovation" dated November 1, 2008 or latest version and comply as outlined in this policy. Certain portions of the work will be confined to evenings, and/or weekends, as identified on the drawings or in the specification sections. This HPM and others, either current or when updated, work in conjunction with this article. Work for this project has been deemed to be **Type D, and requires CLASS IV precautions** under HPM 138-24.

B. 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.

C. Establish and maintain a dust control program as part of the contractor's infection prevention measures in accordance with the guidelines provided by ICRA Group and as specified here. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to the COTR and Contracting Officer and Facility ICRA team 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.

D. 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 COTR, Contracting Officer 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.

E. 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 COTR and Contracting Officer. 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 COTR and Contracting Officer. 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, smoke tight, one-hour and/or two-hour fire-rated temporary drywall construction barriers, as required, 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 COTR, Contracting Officer 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 98% 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 pre-filter 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 610mm x 914mm (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 COTR, Contracting Officer 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 **twelve (12) hours**. Remove and dispose of porous materials that remain damp for more than **seventy-two (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.

F. **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 and/or in accordance with Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT:

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings and/or in specifications as items to be stored. The COTR and Contracting Officer may also designate items to remain the property of the Government. 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 COTR and Contracting Officer.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from the Medical Center, or taken to the

Engineering Shop area by the contractor on a case-by-case basis as directed by the COTR.

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.
4. During above ceiling work, the contractor will have to clear rooms, protect VA property and finishes, and move furnishings as necessary to protect the area an items from dust and debris, in the performance of the work above the ceiling.
5. **PCB Transformers, PCB Capacitors and Other Hazardous Waste**: The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors and other Hazardous Waste. The transformers and capacitors and other Hazardous Waste shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR), Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7 also apply. Upon removal of PCB transformers and capacitors and other Hazardous Waste for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's COTR and Contracting Officer.
   a. Copies of the following listed CFR titles may be obtained from the Government Printing Office:

      40 CFR 261.....Identification and Listing of Hazardous Waste
      40 CFR 262.....Standards Applicable to Generators of Hazardous Waste
      40 CFR 263.....Standards Applicable to Transporters of Hazardous Waste

40 CFR 761.....PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions

49 CFR 172.....Hazardous Material tables and Hazardous Material Communications Regulations

49 CFR 173.....Shippers - General Requirements for Shipments and Packaging

49 CRR 173.....Subpart A General

49 CFR 173.....Subpart B Preparation of Hazardous Material for Transportation

49 CFR 173.....Subpart J Other Regulated Material; Definitions and Preparation

TSCA.....Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7

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 sites, 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. The contractor shall replace, at their own expense, items damaged to the satisfaction of the COTR and Contracting Officer.

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

C. Contractor shall take all measures and provide all materials necessary for protecting and preserving existing equipment and property in affected areas of construction against dust, debris and physical damage, so that equipment and affected areas to be used in Medical Center operations will not be hindered. Contractor shall permit access to VA personnel through construction areas as required for maintenance and normal Medical Center operations.

D. When the construction area is turned over to Contractor, Contractor shall accept entire responsibility there-of. Contractor shall maintain in operating condition, existing fire protection, exit light circuits, alarm equipment, and other operational originating in, or passing through the construction area. **IT IS VERY IMPORTANT ESSENTIAL AND LIFE SAFETY SYSTEMS BE CONTINUOUSLY MAINTAINED AND NOT INTERUPPTED WITHOUT <u>TWENTY-ONE (21) CALENDAR DAYS</u> PRIOR WRITTEN NOTICE TO THE MEDICAL CENTER.**

E. Items of equipment and furnishings located in rooms in which work is to be done under this contract shall remain the property of the Government. During the alteration period when rooms and space are vacated by Veterans' Affairs, such items which are not required by drawings and specifications to be either relocated or reused, will be removed or protected by the Contractor as directed by the COTR.

F. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Article 1.7, "Alterations", Article 1.11, "Restoration", and Article 1.6, "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

G. Refer to FAR clause 52.236-7, "Permits and Responsibilities." A National Pollutant Discharge Elimination System (NPDES) permit is required for projects when the disturbed area on the site one acre or more. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate medical center) office. The apparent low bidder, contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied

by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:

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

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 COTR and Contracting Officer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COTR and Contracting Officer 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).

1.12 PHYSICAL DATA

A. Data and information furnished or referred to below, in the contract specification sections, on the contract drawings, and/or in other VA furnished documentation 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. The contractor shall be responsible for conducting a thorough site investigation, before bidding, to satisfy themselves as to actual conditions.

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

1.13 PROFESSIONAL SURVEYING SERVICES

A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor 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 COTR and Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other established marks, until authorized to remove them by the COTR and Contracting Officer. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

B. Establish and plainly mark center lines for each building and/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 demolition and before any other permanent work is performed, establish and plainly mark, through use of appropriate other means, sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and elevations of all major features of work. Survey shall include, but not be limited to, location of exterior walls, center lines of columns in 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 civil engineer. Furnish such certification to the VA COTR and Contracting Officer before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.

D. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article 1.13, "Professional Surveying Services".

1.15 AS-BUILT DRAWINGS

A. The contractor shall maintain two (2) full size sets of as-built (working) 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. Additional sketches will be required where original

detail is changed, site conditions differ, and where required to clarify mark-ups. To insure compliance, as-built drawings shall be made available for the COTR and Contracting Officer's review, as often as requested.

C. Contractor shall deliver two (2) approved completed sets of as-built drawings to the COTR and Contracting Officer within **fifteen (15) calendar days** after each completed phase of the project by the COTR and Contracting Officer.

D. Upon completion of the project and before final settlement, Contractor shall deliver two (2) approved completed detailed sets of as-built drawings to the COTR and Contracting Officer within **fifteen (15) calendar days** after project acceptance. These drawings shall show sizes, materials, connections to existing structures, utilities, building service equipment, circuits, electrical conduit and junction box locations and routes, and other required information.

E. Paragraphs A, B, C & D shall also apply to ALL shop drawings and Installation drawings provided by equipment suppliers and vendors.

F. Charts, Graphs and Other Information: Provide four (4) hard copies and one (1) electronic of all valve locations for plumbing, mechanical & medical gas valve locations. One chart shall be mounted in the mechanical room location as directed by the COTR. Chart shall be plastic laminate or in suitable picture frame.

1.16 USE OF ROADWAYS, PARKING LOTS AND GROUNDS

A. For hauling, use only established public roads. For hauling, use Roads, Parking Lots and Grounds, and such temporary roads which are necessary in the performance of contract work on Medical Center property, when authorized by the COTR and Contracting Officer. 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.

D. To minimize interference of construction activities with the flow of Medical Center Traffic and Parking, comply with the following:
   1. Keep roads, walks and entrances to grounds, parking, and occupied areas of buildings, clear of all construction materials, debris, vehicles, and standing equipment.
   2. The Warehouse Supervisor shall approve all loading and unloading, and material movements at the north docks.
   3. Methods and scheduling for the cutting, altering, removal and/or blockage of existing roads, walks, entrances, parking lots and grounds must be approved by the COTR and Contracting Officer prior to any work.
   4. The Contractor shall submit a request to interrupt any roadway, parking lot, or loading dock to the Contracting Officer, in writing, **twenty-one (21) calendar days in advance** of any proposed interruption. The request shall state the reason, areas to be affected, date, exact time of, and approximate duration of such interruption.

1.17 COTR AND CONTRACTING OFFICER FIELD OFFICES

A. The Contracting Officer's field office is physically located five miles east of the Main Campus / Facility. The physical address of the Contracting Section (ASAO 8) is Suite 525, located at 8875 Hidden River Parkway, Tampa, FL 33637-1035.

B. The COTR's field office is physically located north of the Main Campus /Facility. The physical address of the Facilities Management Services (FMS), Project Section (138P) is Suite 202, located at 2702 East 131 Avenue, Tampa, FL 33612.

1.18 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:
   1. Permission to use each unit or system must be given in writing by the COTR and Contracting Officer. If the equipment is not installed and maintained in accordance with the following provisions, the COTR and Contracting Officer will withdraw permission for use of the equipment. Metering may be required based on project use.

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. ALL controls for the equipment shall be functioning properly to prevent damage to the equipment.
5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced periodically during construction and at completion of construction and prior to testing and balancing of system.
6. All components of equipment and distribution systems 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. Equipment and distribution systems must be operated as a complete system and be fully maintained by operating personnel.

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.

1.19 TEMPORARY USE OF EXISTING ELEVATORS

A. Contractor will not be allowed the use of existing Medical Center elevators for handling building materials and equipment and personnel, unless approved in writing by the COTR and Contracting Officer. Outside

type hoist, crane, and/or elevator shall be used by Contractor for transporting materials and equipment and personnel.

B. Use of existing Medical Center elevators for handling building materials, equipment and Contractor's personnel will be permitted subject to following provisions:

1. Contractor makes all arrangements with the COTR and Contracting Officer for use of elevators. The COTR and Contracting Officer will ascertain that elevators are in proper condition. The Contractor may, if approved by the COTR and the Contracting Officer, have exclusive use or daily use of the designated elevator(s), except for Facilities Maintenance & Operations. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.
2. Contractor covers and provides maximum protection of following elevator components:
   a. Entrance jambs, heads soffits and threshold plates.
   b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
   c. Finish flooring.
   d. All other components.
3. When under exclusive use: Government will accept hoisting ropes of elevator and rope of each speed governor (or appropriate elevator lifting mechanisms) if they are worn under normal operation. However, if these ropes (or appropriate elevator lifting mechanisms) are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes (or appropriate elevator lifting mechanisms).
4. When under exclusive use: If brake lining (or appropriate elevator braking mechanisms) of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining (or appropriate elevator braking mechanisms).
5. When under exclusive use: All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts, if recommended by elevator inspector after elevator is released by Contractor.

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

1.20 TEMPORARY TOILETS

A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by the COTR and Contracting Officer, provide suitable dry closets where directed. Keep such places clean and free from flies and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

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

1.21 AVAILABILITY AND USE OF UTILITY SERVICES

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

B. **Temporary Utilities**: 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 and unless otherwise directed by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

C. **Meters**: Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity and other utilities at the request of the CO or COTR.

D. **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 the Medical Center heating distribution system.
   a. Steam is available at no cost to Contractor. The Contractor may connect to existing systems at their own expense.

E. **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.

F. **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 the COTR and Contracting Officer discretion) of use of water from the Medical Center's system.

G. **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 the COTR and Contracting Officer discretion), of use of steam from the Medical Center's system.

H. **Fuel**: Natural gas, LP gas and/or burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of

boiler, burner, or control devices, or for prolong use of generator power shall be furnished by the Contractor at Contractor's expense.

I. **Sewer**: Furnish temporary sewer service.

1. Sewer/sanitary waste service may be obtained (site dependent) by connecting to the Medical Center sewer/sanitary waste distribution system. Provide backflow preventer at each connection as required. Provide cleanouts at each connection. Sewer 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 the COTR and Contracting Officer discretion) of use of sewer/sanitary waste from the Medical Center's system.
3. Contractor may need to obtain a storage tank for sewer services and have it pumped out as necessary, at their own expense.

J. **Connections**: ALL connections to and disconnections from existing utility services shall be coordinated per this specification section. Refer to Article 1.6 OPERATIONS AND STORAGE AREAS, paragraphs for Utility Services, Existing Utility Services, Abandoned Lines and others.

1.22 NEW TELEPHONE EQUIPMENT

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

1.23 TESTS / COMMISSIONING

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. A copy of the testing agency field reports shall be submitted with the Daily Log report for the day the testing was conducted.

B. Conduct final tests required in various sections of specifications in presence of the COTR and/or an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests. A copy of the testing agency field reports shall be submitted with the Daily Log report for the day the testing was conducted.

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, feed-water, 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 results of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.24 INSTRUCTIONS

A. Contractor shall furnish Maintenance and Operating manuals, verbal instructions, video instructions, and computer based instructions when required by the various sections of the specifications and as hereinafter specified.

B. **Manuals**: Provide Maintenance and Operating manuals (**three [3] copies each**) for each separate piece of equipment and system shall be delivered to the COTR and Contracting Officer coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment and system. They shall include complete information necessary for starting, adjusting, programming, 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. Manuals shall include all wiring diagrams, pipe and tubing diagrams, programming instructions, and other required information to completely maintain and operate each piece of equipment

and system. 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**: Provide **four (4) hours of training, two (2) hours each/sessions or as specified, one session will be non-standard hours. [Unless otherwise scheduled by the COTR and Contracting Officer]**, for VA personnel for each piece of equipment, each component piece of the equipment, and each system. 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 and system. 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 COTR, the Contracting Officer, and the M&O Supervisor, and shall be considered concluded only when the COTR, the Contracting Officer, and the M&O Supervisor, are 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 COTR and Contracting Officer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above. Training sessions may be recorded by the VA.

1.25 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government - furnished property shown on the Schedules and/or 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, as required, not less than 90 calendar days before Completion Date of project.

D. Storage space for some, but not all, equipment may be provided by the Government and the Contractor shall be prepared to unload and store such equipment therein upon its receipt at the Medical Center. Coordination with the COTR and the Contracting Officer is required.

E. Notify Contracting Officer in writing, 60 calendar 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.

F. 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.

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

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

1.26 RELOCATED EQUIPMENT AND 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 on the drawings to be relocated by the Contractor.

B. Perform relocation of such equipment or items at such times and in such a manner as indicated in the drawings and specifications and/or as directed by the COTR and Contracting Officer.

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.

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

E. Contractor shall employ services of an installation engineer, who is an authorized representative of the manufacturer of this equipment to supervise disassembly, assembly and installation of existing equipment and items, required to be relocated.

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

1.27 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT

A. Contractor shall complete areas and/or rooms to be renovated and coordinate with the COTR and Contracting Officer the use of elevators and areas/rooms for storage of certain materials and equipment by Department of Veterans Affairs.

1.28 CONSTRUCTION SIGN

A. Maintain signs and remove when directed by the COTR and Contracting Officer.

B. Provide two (2) construction signs at each entrance to the construction areas. Signs shall be constructed of a durable material, twelve (12) inches high and thirty (30) inches wide with yellow background and blue

Helvetica lettering two (2) inches high. Letter as shown in the following:

DANGER - KEEP OUT

CONSTRUCTION AREA

AUTHORIZED PERSONNEL ONLY

EXCUSE THE INCONVENIENCE

WE ARE WORKING TO IMPROVE YOUR FACILITY

1.29 SAFETY SIGN

A. Provide a Safety Sign where directed by COTR and Contracting Officer. Face of sign shall be 19 mm (3/4 inch) thick exterior grade plywood. Provide two 102 mm x 102 mm (four x four inch) posts extending full height of sign and 914 mm (three feet) into ground. Set bottom of sign level at 1219 mm (four feet) above ground.

B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design shall be painted with gloss paint of colors noted.

C. Maintain signs and remove when directed by COTR and Contracting Officer.

D. Provide a Detail Drawing of construction sign showing required legend and other characteristics of sign to the COTR and Contracting Officer for approval. Upon written approval, the contractor will construct and install the construction sign.

E. Post the number of accident free days on a daily basis.

F. Provide all OSHA required Safety Signs where required by OSHA and where directed by COTR and Contracting Officer. These shall be commercially produced.

1.30 CONSTRUCTION DIGITAL IMAGES

A. Prior to and During the construction period through completion, furnish Department of Veterans Affairs with digital images, including one color print of each view and one Compact Disc (CD) per visit containing those views taken on that visit. Digital views shall be taken of exterior and/or interior as selected and directed by COTR and Contracting Officer. Each view shall be taken with a minimum size of 6 megapixels (MP) and the images will be a minimum of 2272 x 1704 pixels for the 203 x 254 mm (8 x 10 inch) prints and 2592 x 1944 pixels for the 406 x 508 mm (16 x 20 inch) prints, as per these specifications:

1. Images will be taken at monthly intervals. However, the VA COTR and Contracting Officer may also direct the taking of special digital images at any time prior to completion and acceptance of contract. If the number of trips to the site exceeds an average of one per month of the contract performance period then an adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
2. In event a greater or lesser number of images than specified above are required by the COTR and Contracting Officer, adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

B. Images on CD-ROM shall be recorded in JPEG format with a minimum of 24 bit color and no reduction in actual picture size. Compressed size of the file shall be no less than 80% or the original with no loss of information. File names shall contain the date the image was taken, the Project number and a unique sequential identifier. The CD-ROM shall also contain an index of all the images contained therein in either a TXT or Microsoft Word format.

C. In case any set of images are not submitted within five calendar days of the date established by the COTR and Contracting Officer for taking thereof, the COTR and Contracting Officer may have such images/photographs taken and cost of same will be deducted from any money due to the Contractor.

1.31 HISTORIC PRESERVATION

A. 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 COTR and Contracting Officer verbally, and then with a written follow up.

1.32 EQUIPMENT

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

B. All required programming devices, two (2) each of specialty tools, two (2) sets of start-up supplies, one (1) additional set of belts – fuses – etc. per each piece of equipment and other items required by the specification sections and drawings shall be furnished.

1.33 FINAL PAYMENT

A. Final payment under this contract shall be withheld pending receipt of ALL tests, close out documents, all equipment manuals, staff training, specialty tools, start-up supplies, as built drawings and certifications. These tests and certifications shall include: sprinkler certification, fire alarm certification, plumbing system leak tests - to include hot – cold - waste - vents, medical gas certifications, fire/smoke wall certification, vibration analysis of motor driven equipment, motor – shaft – base - pulley alignment certifications, HVAC TAB, Air Handler control demonstration/training of VA personnel, and other required information, completed punch list items and the return of all keys.

1.34 WARRANTY CALLS

A. The Government may contact the Contractor for warranty services by telephone, fax, e-mail, letter, or in person. The Contractor shall respond with actual physical repair activity (labor, equipment, materials, etc.) in accordance with contract documents. Please note that emergency calls may occur during other than normal work hours. A representative from the Facilities Management Service will identify the emergency calls.

1.35 ATTACHMENTS

A. **Appendices:**

1. **Appendix A** - Approved OSHA Training Providers List
2. **Appendix B** - VA Adopted Codes
3. **Appendix C** - Proper Procedures and Forms for all Utility Shutdowns and Live Electrical Work
4. **Appendix D** – Safety and Infection Control Guide.

B. **Forms:**

1. **Attachment 1 A / B** - Notification of Impaired Fire Protection by Contractor Personnel/Notification of Restored Fire Protection by Contractor Personnel
2. **Attachment 2** - Notification of Hot Work Operations by Contractor Personnel (Burn Permit)
3. **Attachment 3** - Hot Work Fire Safety Check List for Operations Area Inspection
4. **Attachment 4** - Construction Fire Safety Check List
5. **Attachment 5 A / B** – Contractor Work Plan/Peer Review Request

C. **Hospital Policy Memoranda:**

1. **HPM 138-15** - Interim Life Safety Measures (ILSM)
2. **HPM 138-24 -** Infection Control During Construction and Renovation (ICRA)
3. **HPM 138-31** - Fire/Smoke Barrier Penetration Permit System
4. **HPM 138-04** - Lockout/Tagout Program

D. **Tampa ISO**

1. **Attachment 6** ***With No Sensitive*** but Require Training- VA Information and Information System Security/Privacy Language

- - - E N D - - -

Appendix A

Approved OSHA Training Providers List

Current List of Approved Outreach On-line Training Websites:

Construction 10 hour

A. Bright Brains / AdvanceOnline - www.advanceonline.com and hosted through:
   1. Region X OSHA Training Institute Education Center: www.regionxoti.org
   2. AGC: http://agc.advanceonline.com
   3. JJ Keller: www.keller-itc.com
B. ClickSafety - www.clicksafety.com and hosted through:
   1. Keene State College: www.keene.edu/conted/osha.cfm
C. 360Training - www.oshacampus.com and hosted through:
   1. Eastern Kentucky University - http://eku.360training.com
   2. Metropolitan Community Colleges - http://mcc.360training.com
   3. Red Rocks Community College - http://rrcc.360training.com
   4. WESTEC OSHA ED Center - http://westec.360training.com

Construction 30 hour

A. Turner Construction - https://www.turnerknowledge.com/turner/livelink.exe?func=login.channelpartner
B. ClickSafety - www.clicksafety.com and hosted through:
   1. Keene State College: www.keene.edu/conted/osha.cfm

Appendix B

VA Adopted Codes

GENERAL: VA has adopted the latest editions of the following codes and standards as a minimum for all projects performed in the modernization, alteration, addition, or improvement of its real property and the construction of new structures. VA design Manuals and Master Specifications specify other codes and standards that VA follows on its projects:

A. VA Directives, Design Manuals, Master Specifications, VA National CAD Standard Application Guide, and other Guidance on the Technical Information Library (TIL) (http://www.cfm.va.gov/til/)
B. International Building Code (IBC), including International Mechanical and Plumbing Codes
C. NFPA 101, Life Safety Code (see NOTES below)
D. NFPA National Fire Codes, with the exception of NFPA 5000 and NFPA 900
E. Occupational, Safety and Health Administration (OSHA) Standards
F. VA Seismic Design Requirements, H-18-8
G. NFPA 70, National Electrical Code (NEC)
H. National Standard Plumbing Code (NSPC)
I. Safety Code for Elevators and Escalators, American Society of Mechanical Engineers (ASME) A 17.1
J. ASME Boiler and Pressure Vessel Codes
K. ASME Code for Pressure Piping
L. Architectural Barriers Act Accessibility Standard (ABAAS) including VA Supplement, Barrier Free Design and (ABA)
M. Building Code Requirements for Reinforced Concrete, American Concrete Institute and Commentary (ACI 318)
N. Manual of Steel Construction, Load and Resistance Factor Design Specifications for Structural Steel Buildings, American Institute of Steel Construction (AISC)
O. Energy policy Act of 2005 (EPAct)
P. American Society of Heating and Refrigeration Engineers (ASHRAE) 90.1, Energy Standards for Buildings Except Low-Rise Residential Buildings
Q. Federal Leadership in High Performance and Sustainable Buildings: Memorandum of Understanding (MOU)
R. Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management

S. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance

T. The Provisions for Construction and Safety Signs. Stated in the General Requirements, Section 01 00 00, of the VA Construction Specifications

U. America Society of Heating and Refrigeration Engineers (ASHRAE), Ventilation for Acceptable Indoor Air Quality – ASHRAE Standard 62.1

V. Safety Standard for Refrigeration Systems – ASHRAE Standard 15

Local Codes: As an agency of the federal government, VA is not subject to local imposition of code enforcement procedures (drawing reviews, building permits, inspections, fees, etc.). VA must function as the Authority Having Jurisdiction (AHJ) and thus has the responsibility to guard public health and safety through enforcing its adopted codes. However, local authorities should be notified about planned projects and given opportunity to review drawings provided that VA does not pay for review or inspection fees.

NOTES:

1. NFPA 101 primarily addresses life safety and fire protection features while the IBC addresses a wide range of considerations, including, but not limited to, structural strength, stability, sanitation, adequate light and ventilation, and energy conservation. VA buildings must meet the requirements of NFPA 101 and documents referenced by NFPA 101 in order to comply with the accreditation requirements of The Joint Commission for the Accreditation of Hospitals. Therefore, designs shall comply with the requirements of the latest edition of NFPA 101 and documents referenced therein. Design features not addressed by NFPA 101 or documents referenced therein shall comply with the requirements of the latest edition of the IBC or as otherwise addressed above in this Program Guide. For design features that are addressed by both the IBC as well as NFPA 101 or a document referenced by NFPA 101, the requirements of NFPA 101 or the document referenced by NFPA 101 shall be used exclusively (this applies even if the IBC requirements are different).
2. **Conflicts between Nationally Recognized Codes and Standards and VA Requirements:** Should a conflict exist between VA requirements and VA adopted nationally recognized codes and standards, the conflict shall be brought to the attention of VA. The resolution of the conflict shall be

made by the authority having jurisdiction for VA to ensure a consistency system wide.

Appendix C

Proper Procedures and Forms for all Access Closures, Utility Shutdowns and Live Electrical Work Request

GENERAL NARRATIVE OF DOCUMENTATION REQUIREMENTS FOR PLANNED UTILITY SHUTDOWNS

General: All of the following types of work will be documented by the requesting party (contractor or in-house maintenance person) in a file folder fitted with two-hole prong paper fasteners. Fasteners will be attached to the tops of each cover of the file folder. This narrative should be used in conjunction with the Utility Shutdown Flow Chart for a clear understanding of the shutdown process.

1. **Planned Utility Shutdown:**

In accordance with Hospital Policy Memorandum No. HPM 138-23, June 2007, a request for utility shutdown must be presented to the Chief, Facilities Management Service (FMS), for evaluation and action to determine whether the shutdown will be classified as routine or major.

A. A **Draft Utility Shutdown** Notice is initiated by the requesting party and upon completion will be stapled to the outside front-cover of the file folder.

B. The **Planned Utility Interruption/ Checklist** will be attached to the inside front-cover using the two-hole prong fastener.

C. The **Work Plan / Peer Review** form (attachment #5) is initiated and attached to the inside back-cover using the two-hole prong fastener.

D. All **Supporting Documents** will be attached to the inside back-cover of the file folder in reverse chronological order (most recent on top). These documents include, but are not limited to, (1) any required permits (enclosed space, above ceiling, etc.) and approvals, (2) drawings / sketches of work, (3) meeting minutes, (4) coordination with affected services, (5) Mitigation Plan, (6) Contingency Plan, (7) shutdown procedures, and (8) start-up procedures, or as required by the Approving Official (Chief, FMS).

2. **Live Electrical Work:**

In accordance with VHA Directive 2006-056, any energized electrical work plan must have the prior knowledge and approval of the Medical Center Director (Exception – The Chief, FMS may approve energized electrical work plans for Branch Circuits, from the final overcurrent protecting devices to the outlets, that do <u>not</u> serve the critical patient care areas, such as Operating Rooms, Critical Care, Intensive Care, Dialysis Units, Isolation Rooms, Catheterization

Laboratories, Emergency Rooms, or Supply, Processing, and Distribution (SPD) rooms).

A. The **Request to Perform Live Electrical Work** (memo to the Hospital Director) is initiated and upon approval will be attached to the inside back-cover using the two-hole prong fastener.

B. The **Work Plan / Peer Review** form (attachment #5) is initiated and attached to the inside back-cover using the two-hole prong fastener.

C. All **Supporting Documents** will be attached to the inside back-cover of the file folder in reverse chronological order (most recent on top). These documents include, but are not limited to, (1) any required permits (enclosed space, above ceiling, etc.) and approvals, (2) drawings / sketches of work, (3) meeting minutes, and (4) coordination with affected services.

3. **Hot Work (Burn):**

Facilities Management Service Standard Operating Procedures No. 138-05, August 2009, defines Hot Work as operations which include "… cutting, welding, brazing, silver soldering and other processes that utilize an open flame or arc." Please note that although Live Electrical Work is sometimes referred to in the trade as Hot Work, it is not (within the context of this document) since under normal working conditions it will not result in an open flame or arc.

A. The **Hot Work (Burn) Permit** is initiated and consists of two documents – the Notification of Hot Work Operations by Contractor Personnel (Burn Permit) and the Hot Work Fire Safety Check List for Operations Area Inspection (Attachments 2 & 3). Upon approval it will be posted at the job site until all work has been completed. After completion of work, the documents will be attached to the inside back-cover of the file folder.

B. The **Work Plan / Peer Review** form (attachment #5) is initiated and attached to the inside back-cover using the two-hole prong fastener.

C. All **Supporting Documents** will be attached to the inside back-cover of the file folder in reverse chronological order (most recent on top). These documents include, but are not limited to, (1) any required permits (enclosed space, above ceiling, etc.) and approvals, (2) drawings / sketches of work, (3) meeting minutes, and (4) coordination with affected services. The following flowchart is based on the Planned Utility Interruption Checklist included within Appendix C.

4. **Planned Access Closure Request:**

A. A request for an access closure must be presented to the Chief, Facilities Management Service (FMS), for evaluation and action to determine whether the closure will be classified as routine or major.

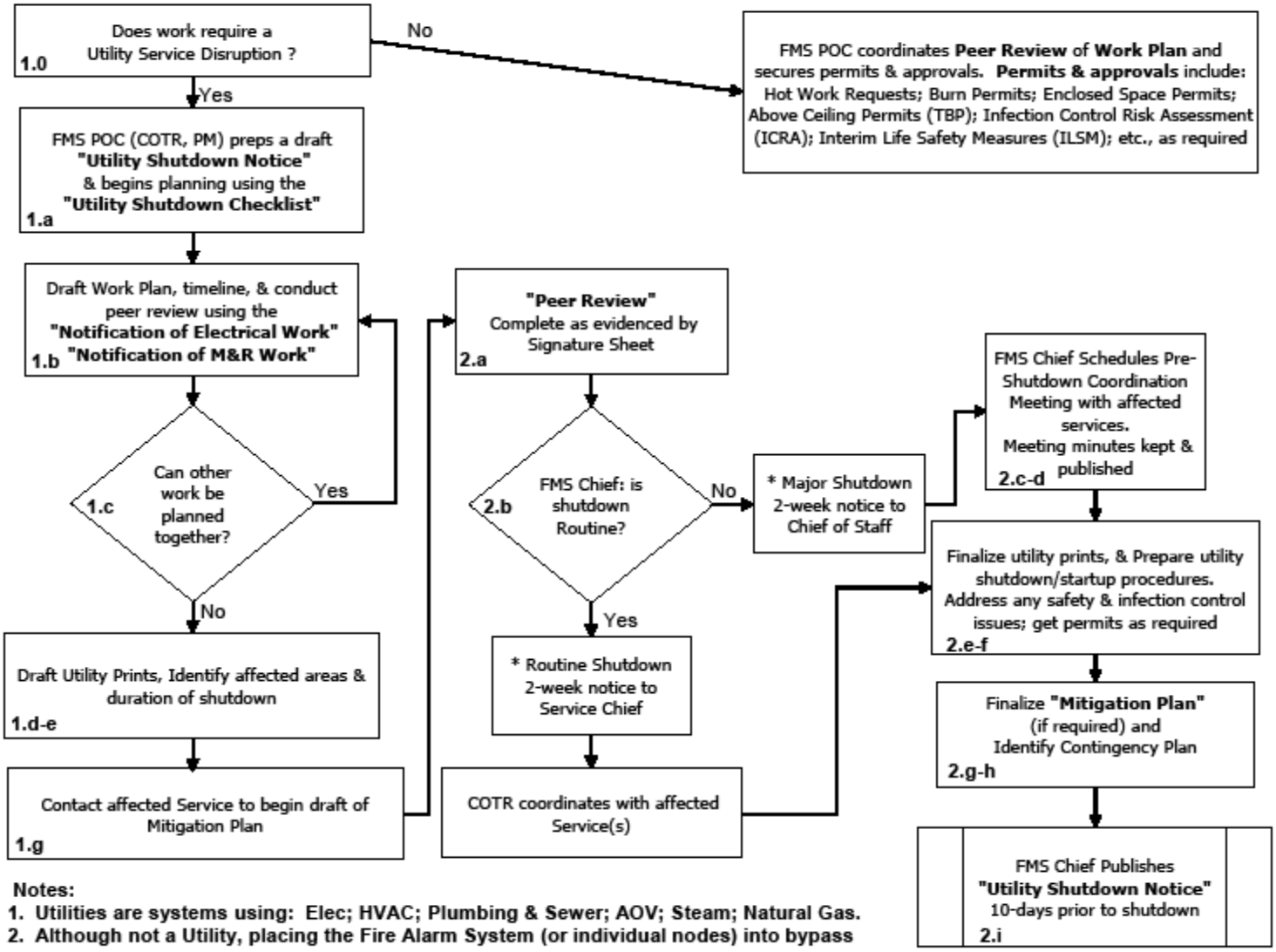
B. A **Draft Closure Notice** is initiated by the requesting party and upon completion will be stapled to the outside front-cover of the file folder.

C. The **Planned Utility Interruption/Closure Checklist** will be attached to the inside front-cover using the two-hole prong fastener.

D. The **Work Plan and Peer Review** form (attachment #5) is initiated and attached to the inside back-cover using the two-hole prong fastener.

E. All **Supporting Documents** will be attached to the inside back-cover of the file folder in reverse chronological order (most recent on top). These documents include, but are not limited to, (1) any required permits (enclosed space, above ceiling, etc.) and approvals, (2) drawings / sketches of work, (3) meeting minutes, (4) coordination with affected services, (5) Mitigation Plan, (6) Contingency Plan, (7) shutdown procedures, and (8) start-up procedures, or as required by the Approving Official (Chief, FMS).

Flowchart - Planned Utility Shutdown



Notes:

1. **Utilities are systems using: Elec; HVAC; Plumbing & Sewer; AOV; Steam; Natural Gas.**
2. **Although not a Utility, placing the Fire Alarm System (or individual nodes) into bypass**

PLANNED UTILITY INTERRUPTION CHECKLIST

Project Name: _____ **Project #** _____

COTR Name: _____ **Phone #:** ( )_____

1. Utility Shutdown Request

#	Item	POC	Comments
1.a.	Draft Utility Shutdown Notice	COTR	
1.b	Work Plan, draft Timeline & Peer review	Contractor / COTR	
1.c	Other Work Plans (Piggyback work)	M&O / COTR	
1.d	Utility prints marked with isolation points for valves, equipment	COTR / M&O	
1.e	Identify affected areas / services	COTR / M&O	
1.f	Identify duration of shutdown	Contractor / COTR	
1.g	Draft mitigation plan	COTR / M&O	

2. Planning the Shutdown

#	Item	POC	Comments
2.a.	Peer Review complete	COTR	
2.b	Chief FMS determines "Routine" or "Major" shutdown	Chief FMS	
2.c	Coordination meetings as applicable		
2.d	Coordinate with affected areas & services*	COTR / M&O	
2.e	Prepare utility shutdown and start-up procedures	M&O Shops	
2.f	Verify & update prints	COTR	
2.g	Finalize Utility Mitigation Plan	M&O	
2.h	Identify Contingency Plan	COTR / M&O	
2.i	Publish Utility Shutdown Notice	COTR	

*Include respiratory therapy on all AOV-related system modifications.

3. Preparation

#	Item	POC	Comments
3.a.	Tag and mark field verified equipment and locations of valves / breakers, switches, etc that disrupt utilities & hospital services*	M&O	
3.b	Stage work materials, pre-fabricated parts, etc. 24 hours before work is to begin. The COTR is to verify that all materials and tools are present.	Contractor	
3.c	Stage mitigation supplies & services	M&O	

3.d	Shutdown folder to CEP, contents include (as applicable): • Final Shutdown Notice • Work Plan with Peer review & Timeline • Mitigation Plan • POC Lists with contact information • Shutdown and Start up procedures	CEP Supervisor	

*Includes all sources of stored energy and services such as medical gasses.

4. Execution

#	Item	POC	Comments
4.a.	COTR informs CEP to initiate shutdown	COTR	
4.b	CEP initiates shutdown*; equipment is LOTO as planned	CEP	
4.c	Monitor shutdown and informs all parties when utility / service is secure	CEP	
4.d	Tracks progress via the Work Plan Timeline	CEP / COTR	
4.e	Notifies CEP when work is complete	COTR	
4.f	Initiates start up procedures to return the utility to service	CEP	
4.g	Notifies AOD when facility returns to safe state	CEP	

*Contact Repertory Therapy POC whenever AOV-related items are affected.

5. Recovery

#	Item	POC	Comments
5.a	Mitigation measures removed; report completion to CEP	CEP / Shops	
5.b	Update Drawings	COTR	
5.c	File Shutdown Folder	Chief, FMS	

Note: Be sure to include the following on this side of 2-Prong Folder. Some elements may be omitted.

1. Notes from Shutdown Meetings / Coordination
2. Mitigation Plan
3. Contingency Plan
4. Shutdown procedures
5. Work Plan / Peer Review
6. Start up procedures

FACILITIES MANAGEMENT SERVICE - ALERT

Distributed:

UTILITY SHUTDOWN NOTICE

UTILITY AREA(S) AFFECTED:		
TIME / DURATION:	**DATE:** _____	**ESTIMATED TIME FRAME:** _____

HOW THIS AFFECTS YOU:
***REASON FOR SHUTDOWN*:**

FMS CONTACT PERSON: _____ , COTR, at ext., or Cell.

If you have any questions or problems with this date, please notify the contact person(s) above by the close of business one day from the date of this publication. After that date, the closure will proceed as described above. Supervisors, please share with all staff.

Julie Lybanon
Acting Chief, Facilities Management Service

PLEASE SHARE WITH ALL STAFF

ENERGIZED (LIVE) ELECTRICAL WORK DIRECTOR MEMO

Date: [Enter Today's Date]

From: Facilities Management Service (138)

Subject: Request to Perform Live Electrical Work for the NRM Project No. 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT".

To: Director (00)

1. In accordance with VHA Directive 2006-056 an energized electrical work plan must have the prior knowledge, and approval of the Medical Center Director.

Description of the work being performed, and the circuits impacted by this work:

_____

_____

_____

_____

_____

2. The start date for this work is ____Day____, _____Date_____ at ___Time___. The estimated duration for this work is _____ hours.
3. Any questions or concerns please call [Enter Name of COTR], Project Engineer / COTR, at extension [COTR Number], VA Cell Phone [COTR Number], or e-mail: [Enter COTR email address]@va.gov.

Julie Lybanon
Acting Chief, Facilities Management Service

Approve / Disapprove

_____

Thomas A. Cappello, Acting Director (00) Date

Enclosure: (#)

Appendix D

Safety and Infection Control Guide

Required to be Posted on the Construction Site

This Safety and Infection Control Guide is for informational purposes only and is not meant to be used in place of the contract.

General Information and Telephone Numbers:

- **CEP** ext. 7080
- **Police** ext. 7554
- **Safety Office** ext. 7292
- **Medical Emergency (Non-Life Threatening)** Dial 911
- **Medical Emergency (Life Threatening)** VA ED / Dial 911

Fire Safety:

- Contractors are to provide their own Fire Extinguishers and are required to perform and document that monthly maintenance has been performed.
- All Contractors' staff should be aware of the exits in and around the construction area and keep them clear.
- If an alarm is activated in the construction area, a member of the construction crew should remain available to advise VA staff as to the cause of the alarm (if known) and dial the CEP at extension 7080.
- Permits are required to perform "Hot Work Operations" including cutting, welding, brazing or silver soldering, or any process that utilizes an open flame.

Safety:

- Ensuring free and unobstructed access to emergency services and for fire, police and other emergency forces.
- Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials.

- Any Lock out / Tag out that needs to be done on utilities or equipment in the facility should go through the COTR and VA Maintenance & Operations Supervisor.
- Any penetrations made by Contractors during construction / renovation activities should be sealed (at least temporarily) at the end of the work shift.
- Smoking is not permitted within the Construction site.

The following is the procedure for reporting a fire at the JAH Facility:

FIRE SAFETY FOR CONTRACTORS

(SEGURIDAD CONTRA INCENDIOS PARA CONTRATISTAS)

CODE RED (FIRE)

CODIGO ROJO (FUEGO)

R – Rescue (Rescatar)

A – Alarm (Activar la Alarma)

Pull the nearest pull station. (Activar la alarma contra incendios mas cercana.)

Call 1 – 2 – 3 and inform the operator of location. (Marcar en el teléfono el numero 1-2-3 para informar a la operadora la localización del fuego.)

C – Contain (Close the door / Isolate the area of fire)
(Contener) (Cerrar las puertas / Aislar el área del fuego)

E – Extinguish / Evacuate (Extinguir / Desalojar)

Privacy:

- Patient information found within a construction site should be turned in to the Nurse Manager or COTR.

Security:

- ID Badges must be worn at all times while on duty.
- Parking is allowed in designated areas only.

Infection Control Orientation for Construction Workers

The dirt and dust that are part of construction activities contain hidden infectious hazards. It is not "just dust". One such hazard is fungal organisms such as *Aspergillus*. *Aspergillus* may be found in decaying leaves and compost, plaster and drywall, standing water, and settled dust. These organisms usually do not cause problems in healthy people, but can cause problems in a hospital with sick patients, especially those with lung problems, or in those with poor immunity, such as transplant or cancer patients. Therefore, it is critical that you do your part to keep everyone in the hospital safe and healthy as possible. We, in turn, will make conditions as safe as possible for you.

1. **Medical Waste**:
   a. Hospital staff will remove any medical waste, including sharp object containers (for used needles and syringes), from construction areas prior to the start of projects.
   b. Please notify your supervisor and the COTR or Resident Engineer *immediately* if you (contract workers) find any needles, syringes, sharp medical objects or red bag waste left in the construction area.
2. **Barrier Walls**:
   a. Construction areas *must* be kept separate from patient care areas by barriers that keep the dust and dirt inside the worksite.
   b. Walls must provide a **complete** seal of the construction area from adjacent areas, 1.8.E.2 (walls may be rigid or 6 mil thick plastic)minimum .
   c. Any gaps or breaks in barriers must be repaired immediately.
3. **Environmental Control**:
   a. The construction zone and adjacent entry areas shall be maintained daily by the Contractor in a clean and sanitary manner.

b. Vacuum dirt and dust routinely inside the work area. This will minimize dirt tracking on shoes and reduce the dust generation inside the work area. (Sweeping creates more dust in the air).
c. Debris shall not be hauled through patient care areas unless approved by Infection Control and the COTR or Resident Engineer.
d. Demolition debris must be removed in carts with a tightly fitted cover.
e. Do not overfill carts so that cover will not fit tightly.
f. If 6 mil plastic minimum is used as cover, no sharp objects shall be allowed to cut through the plastic.
g. Wipe down the exterior of the carts with a damp rag to remove dust before taking it through the hospital.
h. Debris removal will follow specified traffic patterns and elevator usage.
i. Sticky or walk - off mats (minimum of 24 x 36 inches) shall be placed immediately outside the construction area and are changed regularly (i.e., whenever they no longer remove dirt from feet).
j. Contractor must ensure that their staff mop any dirt / dust tracking which occurs outside the construction barrier by their workers with a damp mop.
k. There shall be no standing water left in the construction area. This includes water in equipment drip pans and any open containers within the construction area.
l. All accidental spills must be cleaned up and dried within 12 hours.
m. Remove and dispose of porous materials that remain damp for more than 48 hours.
n. Optimally, construction-zone air will be exhausted directly to the outside with no potential for re-circulation. If an existing direct exhaust system cannot be located and a tie into re-circulated air system is necessary, a pre-filter and high efficiency filter (95%) will be used prior to exhaust to prevent contamination of the duct. The filters will be changed routinely so that operational performance of unit is maintained.
o. Negative air pressure must be maintained within the construction area for all projects that generate a moderate or high level of dust and are adjacent to any patient care or treatment area.
p. Contractors working in a sterile or invasive procedure area of the hospital will be provided with a disposable coverall, head cover, and

shoe covers that must be worn upon entry and removed after exiting that area.

q. Tools and equipment must be damp-wiped prior to entry and exit from sterile and invasive procedure areas.

r. All equipment, tools, material, etc., transported through **occupied** patient areas shall be made free from dust and moisture by vacuuming and wipe down.

s. Water mist work surface to control dust when cutting or drilling.

t. Seal unused doors with duct tape.

u. Block off and seal air vents in construction area to prevent duct contamination.

v. Seal holes, pipes, conduits and punctures appropriately.

w. If demolition chutes are used, they must be sealed when not in use. The chute and damper should be sprayed with water, as necessary, to maintain dust control.

x. Control, collection and disposal must be provided for any drain liquid or sludge found when demolishing plumbing.

y. During outside excavation work, exterior window seals may be required to reduce the amount of outside dust entering the building.

4. Worksite Access Control:

a. Use designated entry and exit procedures.

b. Keep all hospital hallways free of debris and dirt.

c. No unauthorized personnel should be allowed to enter the construction areas.

d. Use designated elevators only.

5. Workers:

a. Clothing and shoes must be free of loose soil and debris when exiting the work area.

b. Use personal protective equipment (masks, face shields, etc.) as indicated for the task at hand.

c. Hand washing is the best method of reducing the transmission of infection. Always wash your hands with soap and water after visiting the restroom, before eating or smoking, and when leaving the construction site.

Please feel free to call the Infection Control Section at:

(813) 972-2000 extensions 4953 or 6953

Pagers 201-1764 or 201-1228

ATTACHMENT #1 - A

NOTIFICATION OF IMPAIRED FIRE PROTECTION BY CONTRACTOR PERSONNEL

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

NAME OF FACILITY
_____

NOTIFIED BY
_____

TITLE _____

COMPANY
_____

NATURE OF IMPAIRMENT
_____
_____

PRECAUTIONS TO BE TAKEN
_____
_____
_____

CLOSED VALVE NO. _____ IN BLDG. NO. _____ LOCATED IN ROOM _____

CONTROLLING _____

ON DATE: Sn,M,T,W,Th,F,St _____ @ TIME _____ AM/PM

BECAUSE:
_____
_____

ON DATE: Sn,M,T,W,Th,F,St _____ @ TIME _____ AM/PM

COTR _____ WAS CONTACTED AT (813) 972-2000

ext. _____ or (813) _____

DATE/TIME SAFETY OFFICER WAS CONTACTED AT EXT. 7598
_____

DATE/TIME EGCC OPERATOR/CEP WAS CONTACTED AT EXT. 7080
_____

DATE/TIME FIRE DEPARTMENT WAS CONTACTED AT (813) 971-3636
_____

DATE/TIME RSFPE WAS CONTACTED AT (____)_____
_____

ATTACHMENT #1 - B

NOTIFICATION OF RESTORED FIRE PROTECTION BY CONTRACTOR PERSONNEL

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

NAME OF FACILITY
_____

NOTIFIED BY
_____

TITLE _____

COMPANY
_____

NATURE OF IMPAIRMENT
_____
_____

AND FULL PROTECTION RESTORED, EXCEPT
_____
_____
_____

OPENED VALVE NO. _____ IN BLDG. NO. _____ LOCATED IN ROOM _____

CONTROLLING _____

ON DATE: Sn,M,T,W,Th,F,St _____ @ TIME _____ AM/PM

BECAUSE:
_____
_____

ON DATE: Sn,M,T,W,Th,F,St _____ @ TIME _____ AM/PM

COTR _____ WAS CONTACTED AT (813) 972-2000

ext. _____ or (813) _____

DATE/TIME SAFETY OFFICER WAS CONTACTED AT EXT. 7598
_____

DATE/TIME EGCC OPERATOR/CEP WAS CONTACTED AT EXT. 7080
_____

DATE/TIME FIRE DEPARTMENT WAS CONTACTED AT (813) 971-3636
_____

DATE/TIME RSFPE WAS CONTACTED AT (_____)_____
_____

ATTACHMENT #2

NOTIFICATION OF HOT WORK OPERATIONS BY CONTRACTOR PERSONNEL (BURN PERMIT)

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

NAME OF FACILITY _____

BUILDING No. & NAME: _____

ON FLOORS: _____

ON DATE: Sn,M,T,W,Th,F,St _____ @ TIME _____ AM/PM

WORK TO BE DONE:

_____

_____

_____

SPECIAL PRECAUTIONS:

_____

_____

_____

_____

NAME OF FIRE WATCH PERSON IF APPLICABLE:

_____

COMMENTS:

_____

_____

_____

_____

NOTIFIED BY _____

NOTIFIERS SIGNATURE & DATE _____

TITLE & PHONE No. _____

CONTRACTOR _____

COTR _____

APPROVAL _____

COTR SIGNATURE & DATE _____

SAFETY STAFF MEMBER _____

SAFETY SIGNATURE & DATE _____

ATTACHMENT #3

HOT WORK FIRE SAFETY CHECK LIST FOR OPERATIONS AREA INSPECTION

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

DATE:_____

_____ Floor swept clean of combustibles.
_____ Floors wet down, covered with damp sand, metal or other shields.
_____ Combustibles material or flammable liquids removed from area, whenever possible.
_____ Combustibles and flammable liquids protected with covers, guards, or metal shields.
_____ All wall and floor openings covered.
_____ Covers suspended beneath work to collect sparks.

WORK BEING DONE ON WALLS OR CEILINGS

_____ Ensure wall construction is noncombustible and is without combustible covering.
_____ Move combustibles away from opposite side of wall.

WORK BEING DONE ON ENCLOSED EQUIPMENT-(TANKS, DUCTS, ETC.)

_____ Remove all combustibles from enclosures.
_____ Purge containers of flammable vapors. Ensure continuous purge so no vapors accumulate during work.

FIRE WATCH

_____ To be provided during and until 30 minutes after operation.
_____ Provided with a 10-pound dry chemical or halon extinguisher and small hose.
_____ Trained in use of equipment and in sounding fire alarm.

FINAL CHECK-UP

_____ To be made 30 minutes after completion of any operation unless fire watch is provided.
_____ Notify Safety Office (extension 7292) when work is complete. (Contractors - notify COTR)
_____ Notify Graphic Control Center (extension 7080), if any fire zones were by-passed

HOT WORK LOCATION _____

NOTIFIERS SIGNATURE & DATE _____

NAME & PHONE No. _____

CONTRACTOR
_____

COTR SIGNATURE & DATE
_____

ATTACHMENT #4

CONSTRUCTION FIRE SAFETY CHECK LIST

(For protection of VA property, patients, visitors and personnel)

PROJECT No. & Title: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

DATE:_____

A. **FIRE EXTINGUISHERS (OSHA 1926.150[c])**

_____ (1) Extinguisher available within 100 feet. Extinguisher rated not less than 2A.
_____ (2) If flammable liquids or gases present, a fire extinguisher rated not less than 10B within 50 feet.

B. IGNITION HAZARDS (OSHA 1926.1511[a])

_____ (1) Internal combustion engines located away from combustibles.
_____ (2) Smoking is prohibited in fire hazard areas (flammables, combustibles).

C. INDOOR STORAGE (OSHA 1926.151[d])

_____ (1) Site kept free from accumulation of unnecessary combustibles.
_____ (2) Storage shall not obstruct means of exits.
_____ (3) Clearance maintained around lights and heating units.

D. FLAMMABLE AND COMBUSTIBLE LIQUIDS (OSHA 1926.152)

_____ (1) Approved containers.
_____ (2) No storage in areas of exits, stairways or people traffic areas.
_____ (3) Max. 25 gal. In room – otherwise approved storage cabinet.

E. TEMPORARY HEATING DEVICES (OSHA 1926.154)

_____ (1) Adequate ventilation for workmen and heater combustion.
_____ (2) Clearance of combustibles from heaters at least 3 feet.
_____ (3) Stability of heater.

F. SIGNS AND BARRICADES (OSHA 1926.200)

_____ (1) Danger signs where immediate hazards exist.
_____ (2) Caution signs where potential hazards exist.
_____ (3) Safety instruction signs where necessary.
_____ (4) Barricades where necessary to protect persons from hazards.

G. WELDING AND CUTTING – HOT WORK PERMIT REQUIRED (NFPA-51B & OSHA 1910.252)

_____ (1) Inspection of area before permit given.
_____ (2) Distance from combustibles 35 feet.
_____ (3) Fire extinguisher in immediate area.

_____ (4) Wall and floor openings covered.
_____ (5) No flammable liquids present.
_____ (6) Inspection after work.

H. ELECTRICAL (OSHA 1924.400-2, 1926.302, & NFPA 241-4)

_____ (1) All temporary wiring grounded and in accordance with National Electric Code (NEC).
_____ (2) Precautions taken to make any open wiring inaccessible to other than authorized personnel.
_____ (3) Temporary light bulb equipped with guards, use heavy duty cords, and not suspended by their cords unless specifically designed for that use.
_____ (4) Runs of open conductors located away from possible damage and fastened at intervals of no greater than 10 feet.
_____ (5) Outlets in construction sites have GFCI or assured equipment grounding.
_____ (6) Extension cords protected from damage. No worn or frayed cables. Not hung from nails or suspended by wire.
_____ (7) Fuses or circuit breaker provided for each feeder or branch circuit.
_____ (8) Electrical powered operated hand tools shall either be of the approved double insulated type or properly grounded.

I. DEMOLITION (OSHA 1926.850-858 and NFPA 241 – Ch.7)

_____ (1) Electric, gas water, steam, etc. shut off prior to work.
_____ (2) Any utilities that are necessary to be maintained need protection.
_____ (3) Masonry walls shall not be permitted to fall on floors such that it would exceed the safe carrying capacity of the floor.
_____ (4) Floor openings within 10 feet of any wall being demolished shall be planked solid except when no one below.
_____ (5) The storage of waste material and debris shall not exceed the floor loading limit.
_____ (6) Construction of dust barriers as needed (not OSHA).
_____ (7) Notification of shut off and protect smoke detectors, etc. during day time only (not OSHA). Coordinated with COTR.
_____ (8) Precautions if floors are soaked with oil or flammable liquids, if dust accumulation is present or other combustibles a present and hot work is being performed.
_____ (9) Smoking is prohibited throughout demolition (NFPA 241, 7-4, 2).
_____ (10) Flammable and combustible liquids removed from area.
_____ (11) Water supplies must still be available from fire hydrants in the vicinity of the structure or area.
_____ (12) Asbestos abatement, breakables (i.e., glass) shall be removed prior to demolition.

J. TEMPORARY BUILDINGS, TRAILERS (NFPA 241, Ch.2)

_____ (1) Temporary offices, trailers, sheds, etc. of combustible construction at least 30 feet from permanent buildings.
_____ (2) Only safety installed approved heating devices used. Ample clearance around stoves, heaters and chimneys per NFPA 211.

K. ROOFING OPERATIONS (NFPA 241, Ch.6)

_____ (1) Asphalt and tar kettles located outside the building or on a noncombustible roof away from combustibles. Kettles must have gravity lids, tight fitting.

_____ (2) Torch applied roofing systems shall be installed using extreme caution. Follow manufacturer's instructions. Caution around roof openings, penetrations or flashings.

_____ (3) Fire extinguisher, 20-B minimum, within 30 feet of roof kettle. At least one extinguisher 2A:20-B:C on the roof being repaired; also one within 30 feet of torch applied roofing equipment.

_____ (4) Fuel containers at least 10 feet away from burner flame.

_____ (5) Notify building occupants who might be affected. Coordinate with C.O.T.R.

_____ (6) Investigate location of supply air intakes. Coordinate shutdowns as necessary with COTR.

_____ (7) Roof edges will be guarded by means of typical roof protection or a safety monitoring system.

L. EXIT PATHWAYS (NFPA 241, Ch.5; also reference NFPA 101)

_____ (1) Every building and area will remain accessible to fire department apparatus and personnel. Roadways will be maintained with 20 feet of all buildings.

_____ (2) Adequate egress paths, including stairs and corridors, will be maintained at all times. Exits may only be blocked temporarily if unavoidable and when adequate alternate measures are provided(signage, temporary fire detection, training, etc.) to warn personnel. Coordinate with COTR.

WORK LOCATION _____

NOTIFIERS SIGNATURE & DATE _____

NAME & PHONE No. _____

CONTRACTOR

_____

COTR SIGNATURE & DATE

_____

ATTACHMENT #5 - A

CONTRACTOR WORK PLAN / PEER REVIEW REQUEST

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

DATE OF WORK: Sn,M,T,W,Th,F,St _____ **START TIME:** _____ AM/PM

END TIME:_____ AM/PM **ESTIMATED DURATION OF WORK:** _____ HOURS

LOCATION OF WORK:

_____

_____

DESCRIPTION OF WORK:

_____

_____

_____

_____

_____

TOOLS & EQUIPMENT TO PERFORM WORK:_____

_____

_____

PERSONNAL PROTECTIVE EQUIPMENT FOR WORK:_____

_____

_____

NAME(S) OF EMPLOYEE(S) PERFORMING WORK:

_____

_____

_____

_____

_____

SUPERVISOR / WORK LEADER SIGNATURE & DATE: _____

SUPERVISOR / WORK LEADER NAME (PRINTED): _____

PROCEEDURE(S): _____

_____

_____

_____

_____

_____

All maintenance and repair work must have a written procedure prepared by the maintenance person performing the task.

Before: _____

During: _____

After: _____

DATE AND TIME COTR NOTIFIED:

_____

GENERAL CONTRACTOR'S NOTIFYING PERSON:

_____

NOTIFYING PERSON'S SIGNATURE:

_____

GENERAL CONTRACTOR COMPANY:

_____

PHONE NUMBER(S):

_____

PEER REVIEW #5 - B

PROJECT No. & TITLE: 673-CSI-100, "SPECIALTY TREATMENT EXPANSION PROJECT"

Name	**Signature**	**Title / Service**	**Date**
		COTR / FMS	
		Elec Supv / FMS	
		AC Supv / FMS	
		Plumb Supv / FMS	
		Controls / FMS	
		M&O Supv / FMS	
		Chief Project / FMS	
		Chief / FMS	

Check all that apply:

_____ Notification of Live Electrical Work

_____ Enclosed Space Permit

_____ Burn Permit (Hot Work)

_____ Safety Review (ILSM)

_____ Infection Controls Review (ICRA)

_____ Above Ceiling Permit

_____ Drawings Enclosed

_____ Mitigation Plan

_____ Contingency Plan

_____ Does the work require a Utility Shutdown?

_____ Is a Shutdown / Closure Coordination Meeting Required?

_____ Utility Shutdown / Closure Notice

_____ Utility Shutdown & Start Up Procedures

_____ Planned Utility Shutdown Checklist and Flow Chart

HPM 138-15: ILSM PROJECT EVALUATION CHECKLIST

Project: _____ **Building / Location:** _____

Floor: _____ **Start Date:** _____ **Finish Date:** _____

Duration: _____

Question	Yes	No	N/A
1. Will existing exits be impaired or blocked?			
2. Will existing corridor width be reduced?			
3. Will alternative exits be required?			
4. Will construction area exit routes be needed?			
5. Will patient access to emergency services be impaired?			
6. Will police, fire, or EMS access to emergency services be impaired?			
7. Will fire alarm system be impaired?			
8. Will sprinkler system be impaired?			
9. Will temporary or equivalent systems be needed?			
10. Will temporary smoke-tight construction partitions be needed?			
11. Will additional handheld fire-fighting equipment be needed?			
12. Will personnel training in the use of handheld fire extinguishers be needed?			
13. Will reinforcement of the smoking policy be needed?			
14. Will a reduction in the flammable or combustible fire load be needed?			
15. Will housekeeping or debris removal practices be needed?			
16. Will additional fire drills or fire response training be needed?			
17. Will increased hazard surveillance of building, grounds, or equipment be needed?			
18. Will special attention to excavations, construction storage, or work areas be needed?			
19. Will training to compensate for structural or compartmentation deficiencies be needed?			
20. Will organization training in LSC deficiencies, construction hazards, or ILSM be needed?			

This evaluation is to be completed by the Safety Office together with the COTR / Project Manager before the start of any construction renovation work to ensure that appropriate ILSM are implemented. If you answered "yes" to any of the questions above, complete all ILSM forms as required and as related to the construction project.

Safety Office: _____ Date: _____

COTR / Project Manager: _____ Date: _____

INTERIM LIFE SAFETY MEASURES (ILSM) ASSIGNMENT

Project: _____ **Building / Location:** _____

Floor: _____ **Start Date:** _____ **Finish Date:** _____

Duration: _____

_____ 1. Ensuring free and unobstructed exit access and exits. Staff receives additional trailing / communication when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction are inspected daily.

_____ 2. Ensuring free and unobstructed access to emergency services and for fire, police and other emergency forces.

_____ 3. Ensuring fire alarm, detection, and suppression systems are in good working order. A temporary, but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly. Provide fire watch or evacuate buildings in the event that the fire alarm, detection or suppression systems are taken out of service for more than four hours in a 24-hour period.

_____ 4. Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire in accordance with Section 01 00 00, General Requirements.

_____ 5. Providing additional fire-fighting equipment and train personnel in its use.

_____ 6. Prohibiting smoking in or adjacent to construction areas.

_____ 7. Developing and enforcing storage, housekeeping, and debris removal practices that reduce the buildings flammable and combustible fire load to the lowest feasible level.

_____ 8. Conducting a minimum of two fire drills per shift per quarter.

_____ 9. Increasing hazard surveillance of buildings, grounds and equipment, with special attention to excavations, construction areas, construction storage, and field offices.

_____ 10. Training personnel to compensate for impaired structural or compartmentation features of fire safety.

_____ 11. Conducting organization wide safety education programs to promote awareness of any LSC deficiencies, construction hazards and these ILSM. Conduct familiarization tours and site visits for local Fire Department, when necessary.

_____ _____

Signature of Safety Office Staff Member Date

_____ _____

Signature of COTR / Project Manager Date

INTERIM LIFE SAFETY MEASURES (ILSM) FOR BUILDING LIFE SAFETY CODE DEFICIENCIES

Building: _____ **Floor:** _____ **Room:** _____

Description of building life safety code deficiency: _____

_____

PFI ID (If Applicable): _____

Corrective Action to be Taken: _____

_____

_____ 1. Ensuring free and unobstructed exit access and exits. Staff receives additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction are inspected daily.

_____ 2. Ensuring free and unobstructed access to emergency services and for fire, police and other emergency forces.

_____ 3. Ensuring fire alarm, detection, and suppression systems are in good working order. A temporary, but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly. Provide fire watch or evacuate buildings in the event that the fire alarm, detection or suppression systems are taken out of service for more than four hours in a 24-hour period.

_____ 4. Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire.

_____ 5. Providing additional fire-fighting equipment and train personnel in its use.

_____ 6. Prohibiting smoking in or adjacent to construction areas.

_____ 7. Developing and enforcing storage, housekeeping, and debris removal practices that reduce the buildings flammable and combustible fire load to the lowest feasible level.

_____ 8. Conducting a minimum of two fire drills per shift per quarter.

_____ 9. Increasing hazard surveillance of buildings, grounds and equipment, with special attention to excavations, construction areas, construction storage, and field offices.

_____ 10. Training personnel to compensate for impaired structural or compartmentation features of fire safety.

_____ 11. Conducting organization wide safety education programs to promote awareness of any LSC deficiencies, construction hazards and these ILSM. Conduct familiarization tours and site visits for local Fire Department, when necessary.

_____ 12. Additional measures are not required.

_____ _____

Signature of Safety Office Staff Member Date

_____ _____

Signature of COTR / Project Manager Date

DAILY CONSTRUCTION SITE INSPECTION

Date: _____ Inspector: _____

Project Number: _____

Description	Yes	No	Comments
Contractor acknowledge asbestos in writing			
Adequate barriers in place			
Smoke proof			
Dust proof			
Signage in place			
Applicable codes complied with			
Occupational Safety & Health Administration (OSHA) compliance			
*Interim Life Safety in place			
*Staff trained regarding Interim Life Safety			
*Temporary fire protection in place / fire watch			
Contractors aware of egress routes			
*Increase in fire drills, other training			
All exits clear			
Free access to Emergency Services			
Alternate access for public and emergency use			
Additional fire fighting staff & equipment available			
Smoking is strictly prohibited			
Construction site clean and orderly			
*Hazard surveillance occurring? How often?			
*Staff informed if adjacent areas affected			
Construction site restricted			
*Local authorities aware of Interim Life Safety			
Effective site storage of materials, other			
*Fire zones maintained, staff aware of changes			
Contractor confirms egress routes for staff clear			
Hot work permits are being issued.			
Penetrations through firewalls are properly sealed			

*** Safety Office:** Complete applicable items as required.

HPM 138-24: INFECTION CONTROL DURING CONSTRUCTION AND RENOVATION (ICRA)

CLASS II PROJECT = Small scale, short duration activities which create minimal dust.

Date of Project: _____ Project Number: _____

Location of Project / Brief Description:

_____

Name of Employee(s) conducting work:

_____

_____

_____

COTR, Resident or Project Engineer, Supervisor, or designated competent person

PROCEDURES DURING PROJECT:

1. Provide active means to prevent airborne dust from dispersing into the atmosphere (check one).
   - _____ Containment booth used.
   - _____ Enclose work area with fire-rated plastic sheeting from floor to ceiling with at least 2-foot overlapping flaps for access to entry.
   - _____ Use HEPA vacuum at point of dust generation.
2. Water mist work surfaces to control dust while cutting.
3. Seal unused doors with duct tape.
4. Block off and seal HVAC returns.
5. Place dust mat at entrance and exit of work area. Clean or change routinely, as needed.
6. Remove or isolate HVAC system in areas where work is being performed.
7. Complete the daily infection control inspection log for projects lasting more than one day and report any deviations to Infection Control.

PROCEDURES UPON PROJECT COMPLETION:

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

3. Wet mop and / or vacuum with HEPA filtered vacuum before leaving work area.
4. Remove isolation of HVAC systems in areas where work is being performed.

_____ _____

Safety Staff Member (date) Infection Control (date)

_____

COTR / Construction Supervisor (date)

CLASS III PROJECT = Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies.

Date of Project: _____ Project Number: _____

Location of Project / Brief Description:

_____

Name of Employee(s) conducting work:

_____

_____

_____

COTR, Resident or Project Engineer, Supervisor, or designated competent person

PROCEDURES DURING PROJECT:

1. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system.
2. Complete all critical barriers (i.e. sheetrock, plywood, plastic), to seal the area from the non – work area or implement the control cube method (cart with plastic covering and sealed connection to the work site with HEPA vacuum for vacuuming prior to exit) before construction begins.
3. Maintain negative air pressure within the work site utilizing HEPA equipped air filtration units.
4. Contain construction waste before transport in tightly covered containers.

5. Cover transport receptacles or carts. Tape the covering unless a solid lid is used.
6. Place dust mat at the entrance / exit of the work area. Clean or change routinely, as needed.
7. Complete the daily infection control inspection log for projects lasting more than one day and report any deviations to Infection Control.

PROCEDURES UPON PROJECT COMPLETION:

1. Do not remove barriers from work area until completed project is inspected by Safety and Infection Control Sections and thoroughly cleaned by Environmental Management Service.
2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
3. Vacuum the work area with HEPA filtered vacuums.
4. Wet mop area with disinfectant.
5. Remove isolation of HVAC system in areas where the work is being performed.

_____ _____

Safety Staff Member (date) Infection Control (date)

_____

COTR / Construction Supervisor (date)

CLASS IV PROJECT = Major demolition and / or construction projects.

Date of Project: _____ Project Number: _____

Location of Project / Brief Description:

_____

Name of Employee(s) conducting work:

_____

_____

COTR, Resident or Project Engineer, Supervisor, or designated competent person

PROCEDURES DURING PROJECT:

1. Isolate HVAC system in area where work is being done to prevent

contamination of the duct system.

2. Complete all critical barriers (i.e. sheetrock, plywood, plastic), to seal the area from the non – work area or implement the control cube method (cart with plastic covering and sealed connection to the work site with HEPA vacuum for vacuuming prior to exit) before construction begins.
3. Maintain negative air pressure within the work site utilizing HEPA equipped air filtration units.
4. Contain construction waste before transport in tightly covered containers.
5. Seal holes, pipes, conduits, and punctures appropriately.
6. Construct an anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving the work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.
7. Complete the daily infection control inspection log for projects lasting more than one day and report any deviations to Infection Control.

PROCEDURES UPON PROJECT COMPLETION:

1. Do not remove barriers from work area until completed project is inspected by the owner's Safety and Infection Control Sections and thoroughly cleaned by the owner's Environmental Management Service.
2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
3. Contain construction waste before transport in tightly covered containers.
4. Cover transport receptacles or carts. Tape covering unless solid lid.
5. Vacuum the work area with HEPA filtered vacuums.
6. Wet mop area with disinfectant.
7. Remove isolation of HVAC system in areas where the work is being performed.

_____ _____

Safety Staff Member (date) Infection Control (date)

_____

COTR / Construction Supervisor (date)

EXTERNAL DEMOLITION AND DIRT EXCAVATION INFECTION CONTROL NOTIFICATION

Date of Project: _____ Project Number: _____

Location of Project / Brief Description:

_____

Name of Employee(s) conducting work:

_____

_____

_____

COTR, Resident or Project Engineer, Supervisor, or designated competent person

Check Items to be Addressed During the Project in the Table Below:

Item	**(√)**	**Recommendation**
Demolition site		Shroud the site if possible to reduce environmental contamination.
Adjacent air intakes		Seal off affected intakes if possible or relocate intake if funds permit.
HVAC system		Consult with the facility engineer about pressure differentials and air recirculation options. Keep facility's indoor air pressure positive relative to the outside.
Filters		Ensure that filters are properly installed. Change pre-filters frequently to prevent dust build-up on high efficiency filters.
Windows		Sealed and caulked to prevent entry of airborne fungal spores.
Doors		Keep closed as much as possible. Do not prop doors open. Seal and caulk unused doors (not emergency exits). Use tacky mats at entrances.
Water pipes		Note water pipe location relative to construction area to prevent intrusion of dust into water systems.
Rooftops		Avoid rooftops during active demolition/construction.
Dust generation		Mist the area with water to minimize dust.
Immune compromised patients		Check likelihood of immune compromised patients being close to construction area. Reroute patient/pedestrian traffic so as to avoid outside areas close to these sites. Use walk-ways protected from demolition / construction sites.
Truck traffic		Reroute if possible or arrange for frequent street cleaning
Education/awareness		Encourage reporting of incidents associated with construction.

_____ _____

Safety Staff Member (date) Infection Control (date)

_____

COTR / Construction Supervisor (date)

DAILY INFECTION CONTROL INSPECTION LOG

Project Number _____ **Project Class** _____ **Date** _____

Follow all provisions listed that apply to the Project Class in the list below:

Class I, II, III, IV		**Comments**
1. Methods in place to minimize dust generation.		
2. Appropriate signage on doors to construction area.		
3. Appropriate debris transport - covered cart, dedicated elevator, dedicated route.		
4. Area cleaned at end of day. Trash to designated area.		
5. No visible signs of mice, insects, birds or other vermin.		
6. Roof protection in place for projects on roof.		
7. Displaced ceiling tiles are readily replaced.		
8. Traffic pattern discourages patient exposure.		
9. Water disruptions, if needed, are scheduled during low activity		
Class II		
10. Fire-rated plastic barrier encloses work area with 2-ft overlapping flaps for access.		
11. Surfaces water-misted to control dust while cutting and/or HEPA vacuum power tool used.		
12. Unused doors sealed with duct tape.		
Class II, III, IV		
13. Air vents blocked off and sealed.		
14. Dust mat at work area entrance and exit. Cleaned or changed routinely.		
15. Floors not showing visible tracked dirt outside construction area.		
16. HVAC system for this area is sealed or isolated		
Class III, IV		
17. Barrier is solid. Critical barriers to seal area in place before beginning work.		
18. Negative air pressure maintained with HEPA equipped units.		
19. Waste contained in tightly covered containers.		
20. Transport carts sealed with tape if not a solid lid.		
Class IV		
21. Patients relocated away from construction area.		
22. HVAC system for this area is isolated.		
23. Holes, pipes, conduits and punctures are sealed appropriately.		
24. Anteroom present and all personnel are required to pass through and be vacuumed with HEPA vacuum prior to leaving site *or* they wear coveralls that are removed each time they leave site.		
25. Barriers in place until final inspection by Safety Office and Infection Control and cleaning by Housekeeping		

_____

Inspector Signature

Attachment 6 ***With No Sensitive*** but Require Training- VA Information and Information System Security/Privacy Language

VA INFORMATION AND INFORMATION SYSTEM SECURITY/PRIVACY LANGUAGE

VA INFORMATION CUSTODIAL LANGUAGE:

a. If VA determines that the contractor has violated any of the information confidentiality, privacy, and security provisions of the contract, it shall be sufficient grounds for VA to withhold payment to the contractor or third party or terminate the contract for default or terminate for cause under Federal Acquisition Regulation (FAR) part 12.

SECURITY INCIDENT INVESTIGATION:

a. The term "security incident" means an event that has, or could have, resulted in unauthorized access to, loss or damage to VA assets, or sensitive information, or an action that breaches VA security procedures. The contractor/subcontractor shall immediately notify the COTR and simultaneously, the designated ISO and Privacy Officer for the contract of any known or suspected security/privacy incidents, or any unauthorized disclosure of sensitive information, including that contained in system(s) to which the contractor/subcontractor has access.

b. To the extent known by the contractor/subcontractor, the contractor/subcontractor's notice to VA shall identify the information involved, the circumstances surrounding the incident (including to whom, how, when, and where the VA information or assets were placed at risk or compromised), and any other information that the contractor/subcontractor considers relevant.

c. With respect to unsecured protected health information, the business associate is deemed to have discovered a data breach when the business associate knew or should have known of a breach of such information. Upon discovery, the business associate must notify the covered entity of the breach. Notifications need to be made in accordance with the executed business associate agreement.

d. In instances of theft or break-in or other criminal activity, the contractor/subcontractor must concurrently report the incident to the appropriate law enforcement entity (or entities) of jurisdiction, including the VA OIG and Security and Law Enforcement. The contractor, its employees, and its subcontractors and their employees shall cooperate with VA and any law enforcement authority responsible for the investigation and prosecution of any possible criminal law violation(s) associated with any incident. The contractor/subcontractor shall cooperate with VA in any civil litigation to recover VA information, obtain monetary or other compensation from a third party for damages arising from any incident, or obtain injunctive relief against any third party arising from, or related to, the incident.

LIQUIDATED DAMAGES FOR DATA BREACH:

a. Consistent with the requirements of 38 U.S.C. §5725, a contract may require access to sensitive personal information. If so, the contractor is

liable to VA for liquidated damages in the event of a data breach or privacy incident involving any SPI the contractor/subcontractor processes or maintains under this contract.

b. The contractor/subcontractor shall provide notice to VA of a "security incident" as set forth in the Security Incident Investigation section above. Upon such notification, VA must secure from a non-Department entity or the VA Office of Inspector General an independent risk analysis of the data breach to determine the level of risk associated with the data breach for the potential misuse of any sensitive personal information involved in the data breach. The term 'data breach' means the loss, theft, or other unauthorized access, or any access other than that incidental to the scope of employment, to data containing sensitive personal information, in electronic or printed form, that results in the potential compromise of the confidentiality or integrity of the data. Contractor shall fully cooperate with the entity performing the risk analysis. Failure to cooperate may be deemed a material breach and grounds for contract termination.

SECURITY CONTROLS COMPLIANCE TESTING :

On a periodic basis, VA, including the Office of Inspector General, reserves the right to evaluate any or all of the security controls and privacy practices implemented by the contractor under the clauses contained within the contract. With 10 working-day's notice, at the request of the government, the contractor must fully cooperate and assist in a government-sponsored security controls assessment at each location wherein VA information is processed or stored, or information systems are developed, operated, maintained, or used on behalf of VA, including those initiated by the Office of Inspector General. The government may conduct a security control assessment on shorter notice (to include unannounced assessments) as determined by VA in the event of a security incident or at any other time.

TRAINING:

a. All contractor employees and subcontractor employees requiring access to VA information and VA information systems shall complete VA Privacy and Information Security Awareness and Rules of Behavior Training.

(1) Sign and acknowledge (either manually or electronically) understanding of and responsibilities for compliance with the *Rules of Behavior.*

b. The contractor shall provide to the contracting officer and/or the COTR a copy of the training certificates and certification of signing the Rules of Behavior for each applicable employee within 1 week of the initiation of the contract and annually thereafter, as required.

c. Failure to complete the mandatory annual training and sign the Rules of Behavior annually, within the timeframe required, is grounds for suspension or termination of all physical or electronic access privileges and removal from work on the contract until such time as the training and documents are complete.

The Certification and Accreditation (C&A) requirements do not apply and a Security Accreditation Package is not required for this SOW.

SECTION 01 23 00
BID OPTIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Bid Options.

1.3 DEFINITIONS

A. Bid Option: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each bid option is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the bid option into Project.

1. Include as part of each bid option, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of bid option.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each bid option. Indicate if bid options have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates. Contractor is to provide dates for VA to inform him of acceptance or rejection each option.

C. Execute accepted bid options under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Bid Options is included at the end of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE OF BID OPTIONS

Deduct Alternate #1- In lieu of the specified brick veneer over the exterior of the building, provide drainable Exterior Insulation Finish System (EIFS) as can be found in the specifications. Provide standard reinforcing mesh typical, except using high impact mesh from 10'AFF down.

Deduct Alternate #2- In lieu of the specified vinyl plank flooring, provide vinyl composition tile (VCT). VCT shall meet the following requirements:

A. Acceptable Tile Manufacturers: Provide vinyl composition tile manufactured by Armstrong, Azrock, GAF, Kentile, or approved equivalent.
B. Colors and Patterns: As shown on drawings.
C. Vinyl Composition Tile: ASTM F 1066-87 Composition 1, 12" x 12" x 1/8" thick.
D. Adhesives: Waterproof, stabilized type recommended by tile manufacturer for type of service indicated.
E. Concrete Slab Primer: Non-staining type recommended by tile manufacturer.
F. Edging Strips: 1/8" thick, vinyl tapered or bullnose edge, as manufactured or recommended by tile manufacturer. Color as shown or scheduled.

Deduct Alternate #3- n/a

Deduct Alternate #4- This item cannot be used in conjunction with Deduct Alternate #3.

A. Delete the entire 2nd floor including structure, i.e. the building will only have Ground floor and 1st floor; no 2nd floor will be built. Floor slab of 2nd floor will become the roof of the building.
B. Roofing: Provide roofing as specified. Provide flashing between new and the existing buildings for watertight condition. Provide roof curbs with 2" bellow expansion joint separating the existing RTU Corridor roof and new roof. Patch the existing roof as required with compatible roofing.

END OF SECTION

G. The remaining area of floor will have perimeter walls with drywall taped and sanded. No interior partitions, no ceiling, no finishes will be installed, unless noted here.

Deduct Alternate #4- This item cannot be used in conjunction with Deduct Alternate #3.

A. Delete the entire 2nd floor including structure, i.e. the building will only have Ground floor and 1st floor; no 2nd floor will be built. Floor slab of 2nd floor will become the roof of the building.

B. Roofing: Provide roofing as specified. Provide flashing between new and the existing buildings for watertight condition. Provide roof curbs with 2" bellow expansion joint separating the existing RTU Corridor roof and new roof. Patch the existing roof as required with compatible roofing.

END OF SECTION

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SECTION 01 32 16
PROJECT SCHEDULES

PART 1- GENERAL

1.1 DESCRIPTION:

A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall 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 will be utilized to satisfy both time and cost applications. All schedule data and reports required under this specification section shall be based upon regular total float, not relative total float schedules.

1.2 CONTRACTOR'S REPRESENTATIVE:

A. The Contractor shall designate an authorized representative in the firm who will be responsible for the preparation of the Project Schedule, review and report progress of the project with and to the Contracting Officer's representative.

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 and such authority shall not be interrupted throughout the duration of the project.

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.

1.3 COMPUTER PRODUCED SCHEDULES

A. The contractor shall provide to the VA monthly computer processing of 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 Microsoft Project Planner 2003 compatible to the contracting officer's representative; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data in Microsoft Project Planner 2003 compatible format; and the resulting monthly updated schedule in an electronic file in Microsoft Project Planner 2003 compatible 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 based upon the monthly schedule updates.

B. The contractor is responsible for the correctness and timeliness of the computer-produced reports. The Contractor is 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 shall report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor will reprocess the computer-produced reports, when requested by the Contracting Officer's representative to correct errors which affect the payment and schedule for the project.

1.4 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

A. Within 30 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three copies of the complete Project Schedule on sheets of paper 279 × 432 mm (11 x 17 inches) and an electronic file in a Microsoft Project Planner 2003 compatible format. 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, duration, predecessor and successor relationships, trade code, area code, description, 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 and start-to-start, only, 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 Project Schedule. 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 a zero duration. The complete working network diagram shall reflect the Contractor's approach to scheduling the complete project. The final network diagram 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 Contractors as bid

schedule. These changes/delays shall be entered at the first update after the final network diagram 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.

B. Within 15 calendar days after receipt of the complete 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 7 calendar days after the joint review, the Contractor shall revise and shall submit three 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.

1.5 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 test, balance and adjust various systems in accordance with the provisions in the General Conditions.

C. In accordance with GENERAL CONDITIONS, 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 ASBESTOS ABATEMENT. The sum of asbestos abatement work activity/event costs shall equal the value of the asbestos bid item in the Contractors' bid.

E. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of the cost loading for each bid item work activities/events shall equal the value of the item in the Contractors' bid.

F. Work activities/events for Contractor bond shall have a trade code and area code of BOND.

1.6 PROJECT SCHEDULE REQUIREMENTS

A. Show on the project schedule the sequence and interdependence of work activities/events required for complete performance of all items of work. In preparing the network diagram, the Contractor shall:

1. Show the following on each work activity/event:
   a. Activity/Event ID number.
   b. Concise description of the work represented by the activity/event. (35 characters or less including spaces preferred).
   c. Performance responsibility or trade code (five alpha characters or less): GEN, MECH, ELEC, CARP, PLAST, or other acceptable abbreviations.
   d. Duration (in work days.)
   e. Cost
   f. Work location (five characters or less), descriptive of the area involved.
   g. Manpower required (average number of men per day).
2. 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 Medical Center 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. Schedule these activities/events so that only one phase is scheduled for completion within the same 30 consecutive calendar day period (except for those phases immediately preceding the final acceptance). Maintain this scheduling condition throughout the length of the contract unless waived by the Contracting Officer's representative in writing.

f. Work activities/events for the asbestos abatement bid item shall have a trade code of ASB.

g. Bid items other than the Base Bid (ITEM 1) and Asbestos Abatement item shall have trade codes corresponding to the appropriate bid item number (e.g., ITM 3, ITM 4 and other items).

3. 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.

4. Break up the work into activities/events of a duration no longer than 20 work days each, 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 Contracting Officer may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals shall not be less than 20 work days. The construction time as determined by the CPM schedule from early start to late finish for any sub-phase, phase or the entire project shall not exceed the contract time(s) specified or shown.

5. 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.

6. Uniquely number each activity/event with numbers ranging from 1 to 99998 only.

B. Submit the following supporting data in addition to the activity/event ID schedule and electronic file (s). Failure of the Contractor to include this data will delay the review of the submittal until the Contracting Officer is in receipt of the missing data:

1. The proposed number of working days per week.

2. The holidays to be observed during the life of the contract (by day, month, and year).

3. The planned number of shifts per day.

4. The number of hours per shift.
5. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted work activities/events.
6. Provide a typed, doubled spaced, description, at least one page in length, of the plan and your approach to constructing the project.

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 Contracting Officer. 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 Contracting Officer's approval of the Project Schedule.

D. 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 Microsoft Project Planner 2003 compatible, (PDM) produced schedule, reflecting all the activities/events of the complete project network diagram being submitted.

1.7 PAYMENT TO THE CONTRACTOR:

A. Monthly, the contractor shall submit the certificate for payment reflecting updated schedule activities and cost. The Contractor is entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated computer-produced calendar-dated schedule unless, in special situations, the Contracting Officer permits an exception to this requirement. Monthly payment requests shall include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Microsoft Project Planner 2003 compatible, to the contracting officer's representative; a listing of all project schedule changes, and associated data, made at the update; and an electronic file (s) of the resulting monthly updated schedule in a compressed Microsoft Project Planner 2003 compatible, format. These must be submitted with and substantively support the contractor's monthly application and certificate for payment request documents.

B. When the Contractor fails or refuses to furnish to the Contracting Officer the information and the associated updated Microsoft Project Planner 2003 compatible, schedule in electronic format, which, in the sole judgment of the Contracting Officer, is necessary for processing the monthly progress payment, the Contractor shall not be deemed to have

provided an estimate and supporting schedule data upon which progress payment may be made.

1.8 PAYMENT AND PROGRESS REPORTING

A. Monthly job site progress meetings may be held on dates mutually agreed to by the Contracting Officer (or Contracting Officer's representative) and the Contractor. Contractor and the CPM consultant should be required to attend all monthly progress meetings. Presence of Subcontractors during progress meeting is optional unless required by the Contracting Officer (or Contracting Officer's representative). The Contractor shall update the project schedule and all other data required by this section shall be accurately filled in and completed prior to the monthly progress meeting. The Contractor shall provide this information to the Contracting Officer or the VA representative in completed form three work days in advance of the progress meeting. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration, required to complete 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 network diagram and computer-produced schedules.
4. Percentage for completed and partially completed activities/events.
5. Logic and duration revisions required by this section of the specifications.
6. Activity/event duration and percent complete shall be updated independently.

B. The Contractor shall submit a narrative report as a part of his monthly review and update, in a form agreed upon by the Contractor and the Contracting Officer. The narrative report shall include a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities/events and completion dates; and an explanation of corrective action taken or proposed. This report is in addition to the daily reports required elsewhere.

C. After completion of the joint review and the Contracting Officer's approval of all entries, the contractor will generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports.

D. After completing the monthly schedule update, the contractor's scheduling specialist 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 specialist shall use the schedule logic and/or durations provided and approved by the COTR. 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 project schedule is approved, the contractor must recreate all manual progress payment updates on this approved project schedule 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.**

E. After VA acceptance and approval of the Project Schedule, and after each monthly update, the contractor shall submit to the Contracting Officer three copies of a revised Project Schedule showing all completed and partially completed activities/events, contract changes and logic changes made on the intervening updates or at the first update.

F. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Specialist, COTR, and all subcontractors needed, as determined by the Contracting Officer, 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.

1.9 RESPONSIBILITY FOR COMPLETION

A. Whenever it becomes apparent from the current monthly progress review meeting or the monthly computer-produced calendar-dated 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 Contracting Officer for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the project schedule before the next update, at no additional cost to the Government.

1.10 CHANGES TO THE SCHEDULE

A. Within 30 calendar days after VA acceptance and approval of any updated computer-produced schedule, the Contractor will submit a revised network diagram, the associated diskette(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, indicate an extension of the project completion by 20 working days or 10 percent of the remaining project duration, whichever is less. Such delays 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 of the network diagram 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 Medical Center, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, must be furnished in writing to the Contracting Officer for approval.

C. Contracting Officer's approval for the revised network diagram 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, 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.

1.11 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 Contracting Officer 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, 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 include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes,

and cost changes, for work in question and its relationship to other activities on the approved network diagram.

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

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

PART 1 - GENERAL

1.1 For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1.2 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.

1.3 Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.

1.4 Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and/or by Resident Engineer on behalf of the Contracting Officer.

1.5 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.

1.6 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 therefore by Contracting Officer, adjustment in contract price and time will be made.

1.7 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.

1.8 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 in quadruplicate. 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. 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.

D. 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.

E. 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.

1.9 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.

1.10 Samples for approval shall be sent to Architect-Engineer, in care of Resident Engineer, VA Medical Center,

_____

(P.O. Address)

_____

(City, State and Zip Code)

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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

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

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

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

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Number: (202) 565-5214
Between 9:00 AM - 3:00 PM

Or can be found on line at http://wbdg.org/ccb/browse_lib.php?l=02

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

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

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

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

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

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

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

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

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

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

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

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

ADC Air Diffusion Council
http://flexibleduct.org

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

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

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

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

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

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

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

AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANLA	American Nursery & Landscape Association http://www.anla.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ASAE	American Society of Agricultural Engineers http://www.asae.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org
BHMA	Builders Hardware Manufacturers Association http://www.buildershardware.com
BIA	Brick Institute of America http://www.bia.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org

CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmb.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute http://www.eei.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.et1.com
FAA	Federal Aviation Administration http://www.faa.gov
FCC	Federal Communications Commission http://www.fcc.gov
FPS	The Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.cssinfo.com/info/gana.html/
FM	Factory Mutual Insurance http://www.fmglobal.com
GA	Gypsum Association http://www.gypsum.org
GSA	General Services Administration http://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org

HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
\ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org\
IMSA	International Municipal Signal Association http://www.imsasafety.org
IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. http://www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NAPHCC	Plumbing-Heating-Cooling Contractors Association http://www.phccweb.org.org
NBS	National Bureau of Standards See - NIST
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors http://www.nationboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association http://www.nema.org
NFPA	National Fire Protection Association http://www.nfpa.org
NHLA	National Hardwood Lumber Association http://www.natlhardwood.org
NIH	National Institute of Health http://www.nih.gov
NIST	National Institute of Standards and Technology http://www.nist.gov
NLMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org

NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879 (301) 670-0604
NSF	National Sanitation Foundation http://www.nsf.org
NWWDA	Window and Door Manufacturers Association http://www.nwwda.org
OSHA	Occupational Safety and Health Administration Department of Labor http://www.osha.gov
PCA	Portland Cement Association http://www.portcement.org
PCI	Precast Prestressed Concrete Institute http://www.pci.org
PPI	The Plastic Pipe Institute http://www.plasticpipe.org
PEI	Porcelain Enamel Institute, Inc. http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org
RFCI	The Resilient Floor Covering Institute http://www.rfci.com
RIS	Redwood Inspection Service See - CRA
RMA	Rubber Manufacturers Association, Inc. http://www.rma.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
IGMA	Insulating Glass Manufacturers Alliance http://www.igmaonline.org
SJI	Steel Joist Institute http://www.steeljoist.org
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org
SSPC	The Society for Protective Coatings http://www.sspc.org

STI	Steel Tank Institute http://www.steeltank.com
SWI	Steel Window Institute http://www.steelwindows.com
TCA	Tile Council of America, Inc. http://www.tileusa.com
TEMA	Tubular Exchange Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute, Inc. 583 D'Onofrio Drive; Suite 200 Madison, WI 53719 (608) 833-5900
UBC	The Uniform Building Code See ICBO
UL	Underwriters' Laboratories Incorporated http://www.ul.com
ULC	Underwriters' Laboratories of Canada http://www.ulc.ca
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Road, P.O. Box 23145 Portland, OR 97223 (503) 639-0651
WRCLA	Western Red Cedar Lumber Association P.O. Box 120786 New Brighton, MN 55112 (612) 633-4334
WWPA	Western Wood Products Association http://www.wwpa.org

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SECTION 01 45 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 and paid for by 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):

T27-06.....Sieve Analysis of Fine and Coarse Aggregates

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

T99-01 (R2004).....The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop

T104-99 (R2003).....Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

T180-01 (R2004).....Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop

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

C. American Concrete Institute (ACI):

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

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

A325-07a.....Structural Bolts, Steel, Heat Treated, 120 ksi Minimum Tensile Strength

A370-08a.....Definitions for Mechanical Testing of Steel Products

A416/A416M-06.....Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

A490-08a.....Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

C31/C31M-08a.....Making and Curing Concrete Test Specimens in the Field

C33-07.....Concrete Aggregates

C39/C39M-05e2.....Compressive Strength of Cylindrical Concrete Specimens
C109/C109M-07e1.....Compressive Strength of Hydraulic Cement Mortars
C138-08.....Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
C140-08.....Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-08.....Slump of Hydraulic Cement Concrete
C172-08.....Sampling Freshly Mixed Concrete
C173-08.....Air Content of freshly Mixed Concrete by the Volumetric Method
C330-05.....Lightweight Aggregates for Structural Concrete
C567-05a.....Density Structural Lightweight Concrete
C780-08.....Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-08.....Sampling and Testing Grout
C1064/C1064M-08.....Freshly Mixed Portland Cement Concrete
C1077-07a.....Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
C1314-07.....Compressive Strength of Masonry Prisms
D698-07e1.....Laboratory Compaction Characteristics of Soil Using Standard Effort
D1143-07.....Piles Under Static Axial Compressive Load
D1188-07.....Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D1556-07.....Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-07.....Laboratory Compaction Characteristics of Soil Using Modified Effort
D2166-06.....Unconfined Compressive Strength of Cohesive Soil
D2167-08.....Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2216-05.....Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D6938-08a.....Density of soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D2974-07a.....Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-07ae1.....Minimum Requirements for Agencies Testing and Inspection Bituminous Paving Materials
D3740-08.....Minimum Requirements for Agencies Engaged in the Testing and Inspecting Road and Paving Material
E94-04.....Radiographic Testing
E164-08.....Ultrasonic Contact Examination of Weldments
E329-08.....Agencies Engaged in Construction Inspection and/or Testing
E543-08a.....Agencies Performing Non-Destructive Testing
E605-93(2006).....Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
E709(2008).....Guide for Magnetic Particle Examination
E1155-96(R2008).....Determining FF Floor Flatness and FL Floor Levelness Numbers

E. American Welding Society (AWS):
D1.1-08.....Structural Welding Code-Steel

1.3 REQUIREMENTS

A. Accreditation Requirements: Testing Laboratory, retained and paid for by Contractor, must be accredited by one or more of the National Voluntary Laboratory Accreditation Program (NVLAP) programs acceptable in the geographic region for the project. Furnish to the Contracting Officer a copy of the Certificate of Accreditation and Scope of Accreditation. For testing laboratories that have not yet obtained accreditation by a NVLAP program, submit an acknowledgement letter from one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the Contracting Officer for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.
   1. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E329.
   2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C1077.
   3. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D3666.
   4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D3740.

5. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A880.
6. Laboratories engaged in non-destructive testing (NDT) shall meet the requirements of ASTM E543.
7. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.

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, and Local Building Authority within 24 hours after each test is completed 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.

E. Test Standards: The Contractor shall include a lump sum allowance of $5000 for furnishing published standards (ASTM, AASHTO, ACI, ANSI, AWS, ASHRAE, UL, etc.) referred to or specifically referenced which are pertinent to any Sections of these specifications. Furnish one set of standards in single copies or bound volumes to the Resident Engineer within 60 days. Photocopies are not acceptable. Billings for the standards furnished shall be at the net cost to Testing Laboratory. A preliminary list of test standards, with the estimated costs, shall be submitted to the Resident Engineer for review before any publications of reference standards are ordered.

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 part time observation of fill placement and compaction and field density testing in building areas and provide part time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698 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 m^2 (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m^2 (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
   b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
   c. Pavement Subgrade: One test for each 335 m^2 (400 square yards), but in no case fewer than two tests.
   d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.

e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.

f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to 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. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.

D. Testing Materials: Test suitability of on-site and off-site borrow as directed by Resident Engineer.

3.2 LANDSCAPING

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

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

B. Submit laboratory test report of topsoil to Resident Engineer.

3.3 ASPHALT CONCRETE PAVING

A. Aggregate Base Course:

1. Determine maximum density and optimum moisture content for aggregate base material in accordance with // AASHTO T180, Method D
2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with AASHTO T191
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.

3.4 SITE WORK CONCRETE

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

3.5 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 m^3 (50 cubic

yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. 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 m^3 (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m^3 (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
    a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
    b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.

12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:
    a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
    b. Inspect preparation of construction, expansion, and isolation joints.
16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
17. Observe concrete mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.
18. Measure concrete flatwork for levelness and flatness as follows:
    a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
    c. Provide the Contractor and the 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/m^3 (pounds per cubic feet).
   f. Weather conditions during placing.
   g. Temperature of concrete in each test cylinder when test cylinder was molded.
   h. Maximum and minimum ambient temperature during placing.
   i. Ambient temperature when concrete sample in test cylinder was taken.
   j. Date delivered to laboratory and date tested.

3.6 REINFORCEMENT

A. Review mill test reports furnished by Contractor.
B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
C. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.7 MASONRY

A. Mortar Tests:
   1. Laboratory compressive strength test:
      a. Comply with ASTM C780.
      b. Obtain samples during or immediately after discharge from batch mixer.
      c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
      d. Test one sample at 7 days and 2 samples at 28 days.
   2. Two tests during first week of operation; one test per week after initial test until masonry completion.
B. Grout Tests:
   1. Laboratory compressive strength test:
      a. Comply with ASTM C1019.
      b. Test one sample at 7 days and 2 samples at 28 days.
      c. Perform test for each 230 m^2 (2500 square feet) of masonry.

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

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

3.8 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.

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

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

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

2. Bolt Inspection:

a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.

b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.

c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.

d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.

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

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

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

3.9 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.

3.10 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.

3.11 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 m^2 (10,000 square feet) of floor area, whichever provides for greater number of tests. Take thickness determinations from each of following locations: Metal deck, beam, and column.
2. Density: Take density determinations from each floor, or one test from each 930 m^2 (10,000 square feet) of floor area, whichever provides for greater number of tests, from each of the following areas: Underside of metal deck, beam flanges, and beam web.

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

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

EP-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.

EP-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.

EP-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

EP-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 and the Contracting Officer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
   a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
   b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
   C. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
   d. Description of the Contractor's environmental protection personnel training program.
   e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's

proposed operations and the requirements imposed by those laws, regulations, and permits.

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

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

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

i. Drawings showing locations of any proposed 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.

EP-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.
   a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
   b. Reuse or conserve the collected topsoil sediment as directed by the Resident Engineer.
   c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that

water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features on the Environmental Protection Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.

6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
7. Manage and control spoil areas on Government property to limit spoil to areas shown on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby water courses or lakes.
8. Protect adjacent areas from despoilment by temporary excavations and embankments.
9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
11. Handle discarded materials other than those included in the solid waste category as directed by the 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 Florida DEP 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.

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SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

DESCRIPTION

This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

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

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

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

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

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

PART 3 EXECUTION

3.1 INSTALLATION

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

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

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

3.2 LOCATION

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

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

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

C. Replace missing, damaged, or illegible signs.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

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

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

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

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

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

1. Soil.
2. Inerts (eg, concrete, masonry and asphalt).
3. Clean dimensional wood and palette wood.
4. Green waste (biodegradable landscaping materials).
5. Engineered wood products (plywood, particle board and I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, 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.

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 reuse and recycle new materials 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 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.

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

C. 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

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.

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

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 COLLECTION

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

3.2 DISPOSAL

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

3.3 REPORT

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

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

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

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SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies demolition and removal but not limited to portions of building interior, building, equipment, and other items as shown on drawings.

1.2 RELATED WORK:

A. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.

B. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.

C. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT; Section 02 82 13.19, ASBESTOS FLOOR TILE AND MASTIC ABATEMENT.

D. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

E. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.8, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements.

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, STRUCTURES, EQUIPMENT, AND IMPROVEMENTS.

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

D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.

E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

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

F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the 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.

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

H. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DEMOLITION:

A. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 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.

B. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade shall be included as part of the lump sum compensation for the work of this section. The removal of hazardous material shall be referred to Hazardous Materials specifications.

C. Any items identified in the Construction Documents to be removed and re-used, or to be relocated, the Contractor shall remove the items with care and store them in a protected area designated by the Resident Engineer. Only the items considered in good condition are to be re-used.

3.2 CLEAN-UP:

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

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SECTION 02 82 11
TRADITIONAL ASBESTOS ABATEMENT

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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. 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 to 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 asbestos containing materials (ACM) and asbestos/waste contaminated elements in an appropriate regulated area for the following approximate quantities;

- 300 square feet of structural fireproofing[1] applied to decking, beams and columns in and above room no. C1-23-1, and 750 square feet of structural fireproofing[1] applied to decking, beams and columns in and above room no. 2B-258.
- 150 square feet of floor tile and adhesive mastic materials in room no. C1-23-1 (included for informational purposes – reference Section 02 82 13.19 for additional information – coordinate with VA representative for sequencing of flooring abatement, where

applicable, within work areas in conjunction with the work of this Section).

[1] = Although suspended ceiling system (consisting of metal grid and suspended tiles) and thermal systems insulation (TSI) within the work areas were found to be non-asbestos-containing, these materials shall be demolished and removed during the abatement process, and shall be treated as asbestos-contaminated.

- Scope of asbestos abatement will also include the construction and subsequent removal of approximately 40 "mini-enclosure" containments within the ground floor corridors CO-07-1, CO-01c-1, CO-01b-1, CO-02-1 and CO-03-1, and computer room GB-026 (reference project drawing sheet ES100). These containments are intended to be used by other trades to temporarily access above-ceiling areas to facilitate electrical wiring installation. These trade representatives will possess the appropriate OSHA Class III asbestos training in accordance with the requirements of the facility's existing operations and maintenance program. Unless otherwise directed by the VA representative, the Contractor shall be responsible for maintaining these enclosures during use, including but not necessarily limited to maintaining negative pressure, supplying protective clothing, and conducting all related cleaning and disposal activities following use. Coordinate all mini-enclosure containment activities closely with both the general contractor and VA representative.

1.1.3 RELATED WORK

A. Section 02 82 13.19, ASBESTOS FLOOR TILE AND MASTIC ABATEMENT
B. Section 07 84 00, FIRESTOPPING.
C. Section 02 41 00, DEMOLITION.
D. Division 09, FINISHES

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, regulated area preparations, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.
B. Abatement activities which may include removal, encapsulation, enclosure, 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 CONTRACTORS 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 pre-abatement work plan. Asbestos abatement 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.

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 estimates which are limited by the physical constraints imposed by occupancy of the building(s). Contractor shall field verify actual configurations, dimensions, and existing conditions. A bid submittal shall constitute confirmation that the Contractor has visited the property and obtained and/or verified all information, including material quantities, as may be required to prepare the bid.

1.3 STOP ASBESTOS REMOVAL

If the Contracting Officer or VA field representative presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered air flow and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. 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 industrial hygienist's time. The occurrence of any of the following

events shall be reported immediately by the Contractor's competent person in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

A. =/> 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
B. breach/break in regulated area 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, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

ACE - Asbestos contaminated elements.

ACM - Asbestos containing material.

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.

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

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 having jurisdiction over the regulated area.

Barrier - Any surface the 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 - Barriers placed over critical barriers and exposed directly to abatement work.

Secondary Barrier - Any additional sheeting 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) - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice 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 industrial hygiene consultant (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) - The asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

Count - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

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.

Disposal bag - Typically 6 mil thick siftproof, dustproof, leaktight 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 which 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 siftproof, dustproof, and leaktight.

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 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 1 percent 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 - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater 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 - 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 - 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.

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's) - EPA's rule to control emissions of asbestos to the environment.

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's.

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 outside the respirator.

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 for organic vapor exposures.

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 sampling/monitoring - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated 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 PEL is 0.1 fibers per cc.

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, sometimes flame retardant in compliance with NFPA 241.

Positive/negative fit check - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

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 (k)(5).

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.

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).

Protection factor - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

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 nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II nonfriable 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. Also used for bag/drum decontamination in the EDF.

Standard operating procedures (SOP's) - Asbestos work procedures required to be submitted by the contractor before work begins.

Supplied air respirator (SAR) - A respirator that utilizes an air supply separate from the air in the regulated area.

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 Industrial Hygienist (VPIH) - Department of Veterans Affairs Professional Industrial Hygienist.

VA Certified Industrial Hygienist (VPCIH) – Department of Veteran's Affairs Professional Certified Industrial Hygienist.

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 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

J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452

K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000

L. NEC National Electrical Code (by NFPA)

M. NEMA National Electrical Manufacturer's Association
2101 L Street, N.W.
Washington, DC 20037

N. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800-344-3555

O. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

P. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402

Q. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

R. USA United States Army
Army Chemical Corps
Department of Defense
Washington, DC 20420

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 abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment 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, 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 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 1910.132 - Personal Protective Equipment
3. Title 29 CFR 1910.134 - Respiratory Protection
4. Title 29 CFR 1926 - Construction Industry Standards
5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication
7. Title 29 CFR 1910.151 - 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)**
   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. State of Florida Statutes, F.S. 469.001-469.015: Licensure for Asbestos Consultants and Contractors

1.5.5 LOCAL REQUIREMENTS

If local requirements are more stringent than federal or state standards, the local standards are to be followed.

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 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.

B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

A. 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. The Contractor shall be a State of Florida licensed Asbestos Abatement Contractor in accordance with Florida Statutes, F.S. 469.001-469.015.

1.5.10 POSTING AND FILING OF REGULATIONS

A. Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each in the clean room 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 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 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 notify the VA.

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.

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 security/police guards.

1.5.13 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 standard operating procedures 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 VA Certified Industrial Hygienist (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, including proof of Florida Asbestos Abatement Contractor licensure.
B. Proof the Competent Person(s) is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person(s) 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 Standard Operating Procedures for Asbestos Abatement. 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. Decontamination area set-up/layout and decontamination procedures for employees;
   4. Abatement methods/procedures and equipment to be used;
   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 asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; 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; 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 (CPIH) 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 standard operating procedure 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, 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 standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;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 respiratory protection 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 the program. 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 qualification. The procedure must 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 airborne 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 airborne 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 individual respirators for their exclusive use.

1.7.5 MEDICAL WRITTEN OPINION

No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

1.7.6 RESPIRATOR FIT TEST

All personnel wearing respirators shall have a current qualitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Quantitative fit tests shall be conducted 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 fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator 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.

1.7.9 SUPPLIED AIR SYSTEMS

If a supplied air system is used, the system shall meet all requirements of 29 CFR 1910.134 and the ANSI/Compressed Gas Association (CGA) Commodity Specification for Air current requirements for Type 1 - Grade D breathing air. Low pressure systems are not allowed to be used on asbestos abatement projects. Supplied Air respirator use shall be in accordance with EPA/NIOSH publication EPA-560-OPTS-86-001 "A Guide to Respiratory Protection for the Asbestos Abatement Industry".

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 opinion the person has been evaluated for working in a heat stress environment while wearing personal protective equipment and is able to perform the work.

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

Provide whole body clothing, head coverings, gloves and 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. 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 - PAPR

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 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 regulated areas in 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 (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.

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 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 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 a minimum 70°F water temperature throughout the PDF and W/EDF.

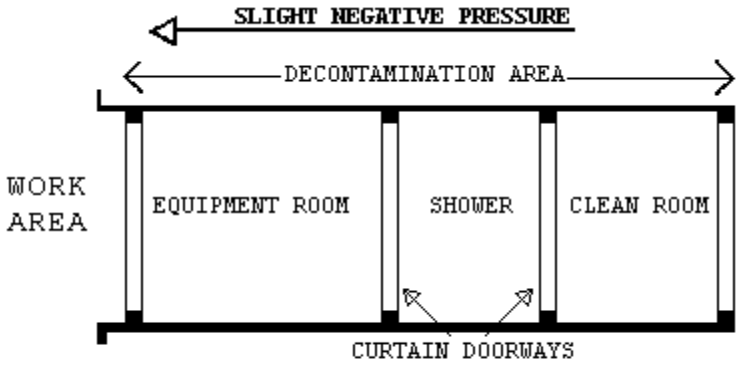
1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)

The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. 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, 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 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 daily 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 look like 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 is minimum of 2 layers of 6 mil opaque fire retardant poly.



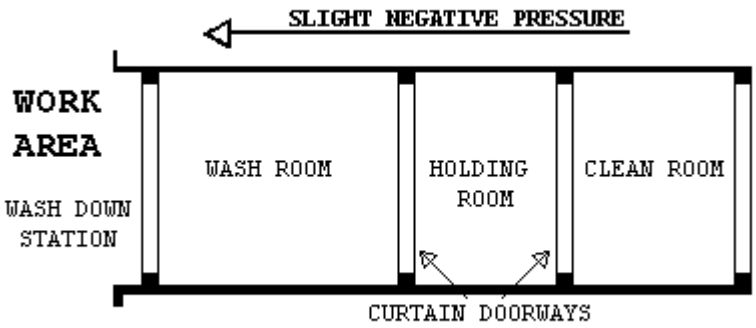
1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

The Competent Person shall provide an 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 3 layers of 6 mil fire retardant poly sheeting. 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 3 layers of 6 mil fire retardant poly sheeting. 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 layers of 6 mil fire retardant poly sheeting. 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 sheeting. 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 provided 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 washdown station in the regulated area, thoroughly wet 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. 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

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 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 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 place.

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 walls in the regulated area shall be a minimum of 4-mils. For floors and all other uses, sheeting of at least 6-mils shall be used in widths selected to minimize the frequency of joints. Fire retardant poly sheeting 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 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, 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 a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive 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 hazard assessment conducted under 29 CFR 1910.132(d).

2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

The Contractor shall provide enough HEPA filtered negative air machines to completely exchange the regulated area air volume eight times per hour. Provide a sufficient number of standby units in the event of machine failure and/or emergency in an adjacent area.

2.1.3 DESIGN AND LAYOUT

A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:

1. Method of supplying power to the units and designation/location of the panels.
2. Description of testing method(s) for correct air volume and pressure differential.
3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

2.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)

A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from

rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.

B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.

C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97% when challenged with 0.3 μm dioctylphthalate (DOP) particles. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10 μm or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5 μm or larger. Pre-filters shall be installed either on or in the intake opening of the NAM and the second stage filter must be held in place with a special housing or clamps.

E. Negative Air Machine Instrumentation: Each unit must be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit must have an elapsed time meter to show total hours of operation.

F. Negative Air Machine Safety and Warning Devices: An electrical/ mechanical lockout must be provide to prevent the fan from being operated without a HEPA filter. Units must be equipped with an automatic

shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.

G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriter's Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

2.1.5 PRESSURE DIFFERENTIAL

The fully operational negative air system within the regulated area shall continuously maintain a minimum pressure differential of -0.02" water column gauge. Before any disturbance of any asbestos material, this shall be demonstrated to the VA by use of a pressure differential meter/manometer as required by OSHA 29 CFR 1926.1101(e)(5)(i). The Competent Person shall be responsible for providing, maintaining, and documenting the negative pressure and air changes as required by OSHA and this specification.

2.1.6 MONITORING

The pressure differential shall be continuously monitored and recorded between the regulated area and the area outside the regulated area with a monitoring device that incorporates a strip chart recorder. The strip chart recorder shall become part of the project log and shall indicate at least -0.02" water column gauge for the duration of the project.

2.1.7 AUXILIARY GENERATOR

If the building is occupied during abatement, provide an auxiliary gasoline/diesel generator located outside the building in an area protected from the weather. In the event of a power failure, the generator must automatically start and supply power to a minimum of 50% of the negative air machines in operation.

2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS

Provide, as needed for proper air flow in the regulated area, in a location approved by the VA, openings in the plastic sheeting to allow outside air to flow into the regulated area. Auxiliary makeup air inlets must be located as far from the negative air machines as possible, off the floor near the ceiling, and away from the barriers that separate the regulated area from the occupied clean areas. Cover the inlets with weighted flaps which will seal in the event of failure of the negative pressure system.

2.1.9 TESTING THE SYSTEM

The negative pressure system must be tested before any ACM is disturbed in any way. After the regulated area has been completely prepared, the decontamination units set up, and the negative air machines installed, start the units up one at a time. Demonstrate and document the operation and testing of the negative pressure system to the VA using smoke tubes and a negative pressure gauge. Testing must also be done at the start of each work shift.

2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM

The demonstration of the operation of the negative pressure system to the VA shall include, but not be limited to, the following:

A. Plastic barriers and sheeting move lightly in toward the regulated area.
B. Curtains of the decontamination units move in toward regulated area.
C. There is a noticeable movement of air through the decontamination units. Use smoke tube to demonstrate air movement from the clean room to the shower room to the equipment room to the regulated area.
D. Use smoke tubes to demonstrate air is moving across all areas in which work is to be done. Use a differential pressure gauge to indicate a negative pressure of at least -0.02" across every barrier separating the regulated area from the rest of the building. Modify the system as necessary to meet the above requirements.

2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS

A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining eight air changes per hour at a minimum negative pressure differential of -0.02" water column gauge, for the duration of the work until visual clearance and air clearance has been completed.
   The negative air machines shall not be shut down for the duration of the project unless authorized by the VA, in writing.
B. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
C. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been completed for that regulated area.

2.1.12 DISMANTLING THE SYSTEM

After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the units may be shut down. The units shall have been **completely decontaminated**, all pre-filters removed and disposed of as asbestos waste, asbestos labels attached and the units inlet/outlet sealed with 2 layers of 6 mil poly.

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered 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 VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in paragraph 2.2.8 of this Section and Section 07 84 00, FIRESTOPPING.

2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA

Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. All uncontaminated removable furniture, equipment and/or supplies shall be removed by the VA from the regulated area before commencing work. Any objects remaining in the regulated area shall be completely covered with 2 layers of 6-mil fire retardant poly sheeting and secured with tape. Lock out and tag out any HVAC/electrical systems in the regulated area.

2.2.3 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 sheeting to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid, fire resistant (drywall/gypsum board) and capable of withstanding the negative pressure.

2.2.4 CRITICAL BARRIERS

Completely separate any operations in the regulated area from adjacent areas using 2 layers of 6 mil fire retardant poly sheeting and tape. Individually seal with 2 layers of 6 mil poly and tape all HVAC openings into the regulated area. Individually seal all lighting fixtures,

clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area.

2.2.5 PRIMARY BARRIERS

A. Cover the regulated area with two layers of 6 mil fire retardant poly sheeting on floors and two layers of 4 mil fire retardant poly sheeting on walls, unless otherwise directed in writing by the VA representative. Floor layers must form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams must overlap at least 1800 mm (6') and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting, where present, shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets must be placed between the bottom and middle layers of poly. Mechanically support and seal with tape and glue all wall layers.

B. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads securely held in place on the plastic. Do not cover rungs or rails with any isolation materials.

2.2.6 SECONDARY BARRIERS

A loose layer of 6 mil shall be used as a drop cloth to protect the primary layers from debris generated during the abatement. This layer shall be replaced as needed during the work, minimally once per work day.

2.2.7 EXTENSION OF THE REGULATED AREA

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. Decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

2.2.8 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 in rating 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. The CPIH shall be 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 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 will 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 monitoring, inspection, testing, and other support services to evaluate whether VA patients, employees, and visitors may be adversely affected by the abatement work, that the abatement work proceeds in general compliance with these specifications, and that the abated areas 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 with review and approval of the VPIH/CIH.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

A. The purpose of the work of the VPIH/CIH is to: evaluate quality; evaluate adherence to the specification; resolve problems; and evaluate the spread of contamination beyond the regulated area. In addition, their work includes performing the inspection and testing to evaluate whether the regulated area has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:

1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
2. Task 2: Perform air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect faults in the regulated area isolation.
3. Task 3: Perform unannounced visits to evaluate 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.
4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
5. Task 5: Perform, in the presence of the VA representative, inspection and testing of a decontaminated regulated area at the conclusion of the abatement to evaluate compliance with these specifications.

B. All documentation, 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 as decontaminated.

2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH

The Contractor's CPIH 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 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 air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing (PAT) program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log shall be kept documenting all OSHA requirements for air 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. The log will contain, at a minimum, information on personnel or area sampled, 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 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 will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

2.4 STANDARD OPERATING PROCEDURES

The Contractor shall have established Standard Operating Procedures (SOP's) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the procedures to be followed during all phases of the work by the Contractor's personnel. The SOP's must be modified as needed to address specific requirements of this project and these specifications. The SOP's 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 SOP's are:

A. Minimum Personnel Qualifications
B. Emergency Action Plan/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 - Containment Barriers/Isolation of Regulated Area
G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
H. Negative Pressure Systems Requirements
I. Monitoring, Inspections, and Testing
J. Removal Procedures for ACM
K. Removal of Contaminated Soil (if applicable)
L. Encapsulation Procedures for ACM
M. Disposal of ACM Waste
N. Regulated Area Decontamination/Clean-up
O. Regulated Area Visual and Air Clearance
P. 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 Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:

1. Supplied air system, if used, 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, fire extinguishers.
4. Respirators, protective clothing, personal protective equipment.
5. Temporary raised platform system drawings (where applicable), signed and sealed by a State of Florida licensed professional engineer.
6. 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. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.

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; 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; Resolution
   3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company 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; provide references, phone numbers, copies of certificates,

accreditations, and licenses. Submit an affidavit signed by the CPIH 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 maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.

1. CPIH: 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 SOP's developed; medical opinion; 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 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; 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; 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 English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides training and how often; who provides medical surveillance and how often; who conducts air monitoring and how is it conducted; a list of references of independent laboratories/IHs familiar with the Contractor's air monitoring and standard operating procedures; 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 and the MSDS. Provide application instructions also.

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/TWA's/EL's. Submit this information daily to the VA representative.

B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.
   1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
   2. Removal of any poly critical/floor barriers.
   3. Visual inspection/testing by the CPIH.
   4. Packaging and removal of ACM waste from regulated area.
   5. 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 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. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will retain the abatement report after completion of the project.

2.6 ENCAPSULANTS

2.6.1 TYPES OF ENCAPSULANTS

A. The following four types of encapsulants, if used, must comply with 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/ft^2).
   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/ft^2) (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.

2.6.3 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.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH 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, 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.

3.1.2 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 10/95 A/E Quality Alert indicating the failure to identify asbestos in the areas listed. Make sure these areas are looked at/reviewed on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; 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; 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. Removal and relocation of regulated area furnishings shall be the responsibility of the Contractor unless otherwise indicated in writing by the VA representative.

D. If required, remove and dispose of carpeting from floors in the regulated area.

E. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.3 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 will inspect the work and systems and will notify the VA 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 SOP's, especially worker

protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.

C. The CPIH shall document the pre-abatement activities described above and deliver a copy to the VA representative.

D. Upon satisfactory inspection of the installation of and operation of systems the VA representative will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification and all applicable regulations.

3.2 REGULATED AREA PREPARATIONS

A. Post OSHA DANGER signs meeting the requirements of OSHA 29 CFR 1926.1101 at approaches to the regulated area or other areas(s) where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at distances sufficiently far enough away from the regulated area to permit personnel to read the sign and take the necessary measures to avoid exposure. Additional signs shall be posted as necessary following construction of the regulated area enclosure.

B. Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Ensure 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.

C. Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Interiors of existing ductwork may require decontamination. Investigate the regulated area and agree on pre-abatement conditions with the VA representative. If cleaning of the existing ductwork interiors is deemed necessary, it shall be conducted during the pre-cleaning phase before the ductwork is sealed off. Appropriate equipment and control measures shall be utilized to prevent contamination of building spaces during this operation. Seal all intake and exhaust vents in the regulated area with tape and 2 layers of fire retardant 6-mil poly sheeting. 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 polyethylene disposal bags for staging and eventual disposal as asbestos waste.

D. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

E. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to shower(s) shall be supplied with backflow prevention.

F. 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. Drapes, clothing, upholstered furniture and other fabric items should be disposed of as asbestos contaminated waste. Cleaning these asbestos contaminated items utilizing HEPA vacuum techniques and off-premises steam cleaning is very difficult and cannot guarantee decontamination. Since adequate cleaning of contaminated fabrics is difficult, the VA representative will determine whether this option is an appropriate one. The VA representative may request that carpeting within the regulated area be removed and disposed of prior to abatement. Carpet removal and disposal shall be the responsibility of the Contractor unless otherwise indicated in writing by the VA representative.

G. 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 precleaning, enclose fixed objects with 2 layers of fire retardant 6-mil poly sheeting and seal securely in place with 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 shall be designated along with specified means of protection. Contact the manufacturer and coordinate with VA representative regarding any special protection requirements.

H. The Contractor shall 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 may 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.

3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA:

Follow requirements of Section 2.2 – Containment Barriers and Coverings in the Regulated Area.

3.4 REMOVAL OF ACM

3.4.1 WETTING ACM

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 representative.

B. Amended Water: 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.

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 removal.

3.4.2 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 (3M) of the area where work is to done. Secure the secondary barrier with duct tape to prevent 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.

3.4.3 WET REMOVAL OF ACM

A. Adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water 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 in the case of electrical hazards or when a greater safety issue is possible**.

B. If ACM does not wet well with amended water due to coating or jacketing, remove as follows:
   1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
   2. Remove saturated ACM in small sections. Do not allow material to dry out. As material is removed, bag material while still wet into disposal bags. Twist tightly the bag neck, bend over (gooseneck) and seal with a minimum of three tight wraps of tape. Clean /decontaminate the outside of any residue and move to washdown station adjacent to W/EDF.
   3. Fireproofing or Architectural Finish on Scratch Coat: Spray with a fine mist of amended water or removal encapsulant. Allow time for saturation to the substrate. Do not oversaturate causing excess dripping. Scrape material from substrate. Remove material in manageable quantities and control falling to staging or floor. If the falling distance is over 20 feet (6M), use a drop chute to contain material through descent. Remove residue remaining on the scratch coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Re-wet the substrate as needed to prevent drying before the residue is removed.
   4. Fireproofing or Architectural Finish on Wire Lath: Spray with a fine mist of amended water or removal encapsulant. Allow time to completely saturate the material. Do not oversaturate causing excess dripping. If the surface has been painted or otherwise coated, cut small holes as needed and apply amended water or removal encapsulant from above. Cut saturated wire lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers may be needed for removal.
   5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM. Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to

the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

3.5 LOCKDOWN ENCAPSULATION

3.5.1 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 surfaces shall be encapsulated with a bridging encapsulant.

3.5.2 DELIVERY AND STORAGE

Deliver materials to the job site in original, new and unopened containers bearing the manufacturer's name and label as well as the following information: name of material, manufacturer's stock number, date of manufacture, thinning instructions, application instructions and the MSDS for the material.

3.5.3 WORKER PROTECTION

Before beginning work with any material for which an MSDS has been submitted, provide workers with any required personal protective equipment. The required personal protective equipment shall be used whenever exposure to the material might occur. In addition to OSHA/specification requirements for respiratory protection, a paint pre-filter and an organic vapor cartridge, at a minimum, shall used in addition to the HEPA filter when a solvent based encapsulant is used. The CPIH shall be responsible for provision of adequate respiratory protection.

3.5.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING

A. Apply two coats of encapsulant to the scratch coat plaster or piping after all ACM has been removed. Apply in strict accordance with the manufacturer's instructions. Any deviation from the instructions must be approved by the VA's representative in writing prior to commencing the work.

B. Apply the encapsulant with an airless sprayer at a pressure and using a nozzle orifice as recommended by the manufacturer. Apply the first coat while the while the scratch coat is still damp from the asbestos removal process, after passing the visual inspection. If the surface has been allowed to dry, wet wipe or HEPA vacuum prior to spraying with encapsulant. Apply a second coat over the first coat in strict conformance with the manufacturer's instructions. Color the encapsulant

and contrast the color in the second coat so that visual confirmation of completeness and uniform coverage of each coat is possible. Adhere to the manufacturer's instructions for coloring. At the completion of the encapsulation, the surface must be a uniform third color produced by the mixture.

3.5.5 SEALING EXPOSED EDGES

Seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, etc., with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant. Apply in accordance with 3.5.4 (B).

3.6 DISPOSAL OF ACM WASTE MATERIALS

3.6.1 GENERAL

Package and dispose of waste as per these specifications and applicable OSHA, EPA and DOT regulations. The landfill requirements for packaging must also be met. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.6.2 PROCEDURES

A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures is this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall 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 required signage 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.

B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.

C. 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.

3.7 PROJECT DECONTAMINATION

3.7.1 GENERAL

A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.

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.

3.7.2 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 paragraph 3.8 of this Section.

3.7.3 WORK DESCRIPTION

Decontamination includes the clearance of the air 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.

3.7.4 PRE-DECONTAMINATION CONDITIONS

A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the loose 6 mil layer 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. Primary barriers consisting of 2 layers of 6 mil poly on the floor and 2 layers of 4 mil poly on the walls.
2. Critical barriers consisting of 2 layers of 6 mil poly which is the sole barrier between the regulated area and openings to the rest of the building or outside.
4. Decontamination facilities for personnel and equipment in operating condition and the negative pressure system in operation.

3.7.5 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 methods. Use each surface of a 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. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

3.7.6 PRE-CLEARANCE INSPECTION AND TESTING

The CPIH 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 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 airborne fiber concentrations below 0.01 f/cc, then the Contractor shall notify the VA representative of the results with a brief report from the CPIH 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.

3.7.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES

With the express written permission of the VA representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification. Negative pressure shall be maintained in the regulated area during the lockdown application.

3.8 VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.8.1 GENERAL

Notify the VA representative 24 hours in advance for the performance of visual inspection and testing. The visual inspection and testing will be performed by the VPIH/CIH following all cleaning activities.

3.8.2 VISUAL INSPECTION

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 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 testing can be conducted.

3.8.3 AIR CLEARANCE TESTING

A. After an acceptable visual inspection by the VPIH/CIH and VA Representative AE Project Engineer, the VPIH/CIH will perform testing. Air samples will be collected and analyzed in accordance with procedures for AHERA in this specification. If asbestos abatement work is less than 260 1f/160 sf, 5 PCM samples may be collected for air clearance. If asbestos abatement work is equal to or greater than 260 1f/160 sf, TEM air clearance sampling shall be conducted. TEM sampling analysis shall be conducted in accordance with the procedures referenced in this specification. If the release criteria are not met, the Contractor shall repeat 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 in accordance with these specifications.

3.8.4 AIR CLEARANCE PROCEDURES

A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and has met the air clearance criteria referenced in Sections 3.8.5 or 3.8.6 of this specification.

B. Air Monitoring and Air 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 0.8μ MCE filters for PCM analysis and 0.45μ Polycarbonate filters for TEM. Before pumps are started, initiate aggressive 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. The negative pressure system shall continue to operate.

3.8.5 CLEARANCE AIR SAMPLING USING PCM – LESS THAN 260LF/160SF:

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.

3.8.6 CLEARANCE AIR SAMPLING USING TEM – EQUAL TO OR GREATER THAN 260LF/160SF:

The USEPA AHERA regulation (40 CFR 763) details the requirements and air clearance criteria using TEM. Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.

3.8.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the air samples. Samples will be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours.

3.8.8 LABORATORY TESTING OF TEM SAMPLES

Samples shall be sent by the VPIH/CIH to an accredited laboratory for analysis by TEM. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples.

3.9 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.9.1 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 and materials from the project area.
B. Dispose of all packaged ACM waste as required.
C. Repair or replace all interior finishes damaged during the abatement work, as required.
D. Fulfill other project closeout requirements as required in this specification.

3.9.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

The CPIH 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.

3.9.3 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.

3.9.4 RE-INSULATION

If required as part of the contract, replace all asbestos containing insulation/fire-proofing with suitable non-asbestos material. Follow

manufacturer's instructions for application/installation and provide MSDS's for all replacement materials.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE:
PROJECT NAME:
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 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 the negative pressure system was installed, operated and maintained in order to provide a minimum of eight air changes per hour with a continuous -0.02" of water column pressure.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

ATTACHMENT #2

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: Date:

   Printed Name of CPIH:

   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

Date

Date

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SECTION 02 82 13.19
ASBESTOS FLOOR TILE AND MASTIC ABATEMENT

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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 (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 Contractor. All cost 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 flooring materials to be abated. 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 flooring in an appropriate regulated area in the following approximate quantities;

- 150 square feet of floor tile and adhesive mastic materials in room no. C1-23-1.

1.1.3 RELATED WORK

A. Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT
B. Section 07 84 00, FIRESTOPPING.
C. Section 02 41 00, DEMOLITION.
D. Division 09, FINISHES.

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 standard operating procedures for Class II 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 pre-abatement work plan. Asbestos abatement 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.

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 estimates which are limited by the physical constraints imposed by occupancy of the building(s). Contractor shall field verify actual configurations, dimensions, and existing conditions. A bid submittal shall constitute confirmation that the Contractor has visited the property and obtained and/or verified all information, including material quantities, as may be required to prepare the bid.

1.3 STOP ASBESTOS REMOVAL

If the Contracting Officer or their field representative presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and adequately wet any exposed

ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/ activities are not within specification requirements. 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 industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal activities and initiate fiber reduction activities:

A. =/> 0.01 f/cc outside a regulated area or >0.05 f/cc inside a regulated area;
B. breach/break in regulated area critical barrier(s)/floor;
C. serious injury/death at the site;
D. fire/safety emergency at the site;
E. respiratory protection system failure;
F. power failure loss of wetting agent; or
G. 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, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

ACE - Asbestos contaminated elements.

ACM - Asbestos containing material.

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.

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

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

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

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 having jurisdiction over the regulated area.

Barrier - Any surface the 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 - Barriers placed over critical barriers and exposed directly to abatement work.

Secondary Barrier - Any additional sheeting 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) - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice 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 industrial hygiene consultant (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) - The Contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

Count - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

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.

Disposal bag - Typically 6 mil thick siftproof, dustproof, leaktight 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 which 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 siftproof, dustproof, and leaktight.

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 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 1 percent 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 - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater 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 - 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 - 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.

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's) - EPA's rule to control emissions of asbestos to the environment.

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's.

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 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 outside the respirator.

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 for organic vapor exposures.

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 sampling/monitoring - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated 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 PEL is 0.1 fibers per cc.

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, sometimes flame retardant in compliance with NFPA 241.

Positive/negative fit check - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

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 (k)(5).

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.

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).

Protection factor - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The

number indicates the reduction of exposure level from outside to inside the respirator.

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 nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II nonfriable 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. Also used for bag/drum decontamination in the EDF.

Standard operating procedures (SOP's) - Asbestos work procedures required to be submitted by the contractor before work begins.

Supplied air respirator (SAR) - A respirator that utilizes an air supply separate from the air in the regulated area.

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 Industrial Hygienist (VPIH/CIH) - Department of Veterans Affairs Professional Industrial Hygienist.

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 or ACM waste material.

Waste/Equipment decontamination area (W/EDA) – The area in which waste is packaged and 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

J. MSHA Mine Safety and Health Administration
Respiratory Protection Division
Ballston Tower #3
Department of Labor
Arlington, VA 22203
703-235-1452

K. NIST National Institute for Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20234
301-921-1000

L. NEC National Electrical Code (by NFPA)

M. NEMA National Electrical Manufacturer's Association
2101 L Street, NW
Washington, DC 20037

N. NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101

Quincy, MA 02269-9101
800-344-3555

O. NIOSH National Institutes for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226
513-533-8236

P. OSHA Occupational Safety and Health Administration
U.S. Department of Labor
Government Printing Office
Washington, DC 20402

Q. UL Underwriters Laboratory
333 Pfingsten Rd.
Northbrook, IL 60062
312-272-8800

R. USA United States Army
Army Chemical Corps
Department of Defense
Washington, DC 20420

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 specifications 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 abatement project. The Contractor is responsible for providing and

maintaining training, accreditations, medical exams, medical records, personal protective equipment as required by applicable Federal, State and Local regulations. The Contractor shall hold the VA and VPIH/CIH consultants harmless for any 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, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements.

1.5.3 FEDERAL REQUIREMENTS

Federal requirements which govern 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 1910.132 - Personal Protective Equipment
   3. Title 29 CFR 1910.134 - Respiratory Protection
   4. Title 29 CFR 1926 - Construction Industry Standards
   5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
   6. Title 29 CFR 1910.1200 - Hazard Communication
   7. Title 29 CFR 1910.151 - 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)**
   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. State of Florida Statutes, F.S. 469.001-469.015: Licensure for Asbestos Consultants and Contractors

1.5.5 LOCAL REQUIREMENTS

If local requirements are more stringent than federal or state standards, the local standards are to be followed.

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 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.

B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

1.5.9 PERMITS/LICENSES

A. 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. The Contractor shall be a State of Florida licensed Asbestos Abatement Contractor in accordance with Florida Statutes, F.S. 469.001-469.015.

1.5.10 POSTING AND FILING OF REGULATIONS

A. 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 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 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 notify the VA.

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 of 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.

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 security guards.

1.5.13 EMERGENCY ACTION PLAN AND ARRANGEMENTS

A. An Emergency Action Plan shall be developed by the Contractor 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 and available in the regulated area. 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 and layout of 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 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 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 standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; and power failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that 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, including proof of Florida Asbestos Abatement Contractor licensure.

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 Standard Operating Procedures for Asbestos Abatement. 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. Decontamination area set-up/layout and Decontamination procedures for employees;
4. Class II abatement methods/procedures and equipment to be used;
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 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 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 asbestos regulations in the past three (3) years; has adequate

liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; 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; 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 (CPIH) 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 standard operating procedure 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, 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 standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;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 respiratory protection 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 the program. The RPPC must provide 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 qualification. The procedure must 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 half face, HEPA filtered, air purifying respirator when airborne fiber levels are maintained consistently at or below 0.1 f/cc. A higher level of respiratory protection may be provided or required, depending on airborne 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 individual respirators for their exclusive use.

1.7.5 MEDICAL WRITTEN OPINION

No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

1.7.6 RESPIRATOR FIT TEST

All personnel wearing respirators shall have a current qualitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A.

1.7.7 RESPIRATOR FIT CHECK

The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator 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. The physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion the person has been evaluated for working in a heat stress environment while wearing personal protective equipment and is able to perform the work.

1.8.3 PERSONAL PROTECTIVE EQUIPMENT

Provide whole body clothing, head coverings, gloves, 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. 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

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 all disposable PPE and dispose of in a disposal bag provided in the regulated area.

B. Carefully decontaminate and clean the respirator. Put in a clean container/bag.

1.8.6 REGULATED AREA REQUIREMENTS

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that requirements applicable to Class II work for regulated areas in 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 a fiber drum with a disposal bag in it for personnel waste materials.

1.9.2 WASTE/EQUIPMENT DECONTAMINATION AREA (W/EDA) – The Competent Person shall provide a W/EDA for removal of all waste, equipment and contaminated material from the regulated area.

1.9.3 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES: Contain all waste in 6 mil poly bags. Clean/decontaminate bags and pass through a double 6 mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. At no time shall unprotected personnel from the clean side be allowed to enter the regulated area.

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 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 materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work 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 place.

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. Poly sheeting for critical barriers/floors in the regulated area shall be 6 mil. Fire retardant poly sheeting 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.

G. An adequate number of infra-red heating units (if used), 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 shall be provided. 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 shall also be provided. All electrically operated hand tools, equipment, electric cords shall be equipped with GFCI protection.

H. 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.)

I. Impermeable fiberboard drums and disposal bags 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.

J. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.

K. 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.

L. 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 hazard assessment conducted under 29 CFR 1910.132(d).

2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA

2.2.1 GENERAL

A. Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces, as required, in the regulated area must be covered 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 VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in paragraph 2.2.7 of this Section and Section 07 84 00, FIRESTOPPING.

B. 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 two layers of 6-mil fire retardant poly sheeting and secure with tape. Lock out and tag out any HVAC systems in the regulated area.

2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA

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

Completely separate any openings into the regulated area from adjacent areas using 2 layers of 6 mil fire retardant poly sheeting and tape. Individually seal with two layers of 6 mil poly and tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area.

2.2.5 SECONDARY BARRIERS:

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 Class II work, except for floor tile abatement. This layer shall be replaced as needed during the work.

2.2.6 EXTENSION OF THE REGULATED AREA

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 in rating 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. The CPIH shall periodically 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 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 will 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 monitoring, inspection, testing,

and other support services to evaluate whether VA patients, employees, and visitors may be adversely affected by the abatement work, that the abatement work proceeds in general compliance with these specifications, and that the abated areas 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 inside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed 0.05 f/cc, the Contractor shall stop work. If fiber levels exceed 0.01 f/cc outside the regulated area, 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 with review and approval of the VPIH/CIH.

2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT

A. The purpose of the work of the VPIH/CIH is to: evaluate quality; evaluate adherence to the specifications, resolve problems; and evaluate the spread of contamination beyond the regulated area. In addition, their work includes performing the inspection and testing to evaluate whether the regulated area has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:

1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
2. Task 2: Perform air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect faults in the regulated area isolation.

3. Task 3: Perform unannounced visits to evaluate 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.
4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
5. Task 5: Perform, in the presence of the VA representative, inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to evaluate compliance with these specifications.

B. All documentation, 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 CONTRACTOR CPIH

The CPIH 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 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 air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing (PAT) program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation.

The analytic laboratory used by the Abatement Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log shall be kept documenting all OSHA requirements for air 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. The log will contain, at a minimum, information on personnel or area sampled, 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 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 will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

2.4 STANDARD OPERATING PROCEDURES

The Contractor shall have established Standard Operating Procedures (SOP's) 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 SOP's must be modified as needed to address specific requirements of the project and these specifications. The SOP's 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 SOP'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 Class II work
G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
H. Monitoring, Inspections, and Testing
I. Removal Procedures for Class II Materials
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 Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.

D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:

1. HEPA vacuums, air monitoring pumps, calibration devices, infrared heating machines, and emergency power generating system.
2. Encapsulants, surfactants, hand held sprayers, airless sprayers, fire extinguishers.
3. Personal protective equipment.
4. 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. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.

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; 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; Resolution
3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company 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; provide references; phone numbers; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH 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 maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.

1. CPIH: 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 SOP's developed; medical opinion; 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 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; 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; 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 English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides training and how often; who provides medical surveillance and how often; who conducts air monitoring and how it is conducted; a list of references of independent laboratories/IH's familiar with the Contractor's air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.

K. When rental equipment is to be used in regulated areas or used to transport asbestos waste, the contractor shall assure complete decontamination of the rental equipment before return to the rental agency.

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/TWA's/EL's. Submit this daily log to VA's representative.

B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.

1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
2. Removal of any poly critical/floor barriers.
3. Visual inspection/testing by the CPIH.
4. Packaging and removal of ACM waste from regulated area.
5. 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 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. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will retain the abatement report after completion of the project.

PART 3 - EXECUTION

3.1 PRE-ABATEMENT ACTIVITIES

3.1.1 PRE-ABATEMENT MEETING

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH 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, 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.

3.1.2 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 10/95 A/E Quality Alert indicating the failure to identify asbestos.

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. Removal and relocation of regulated area furnishings

shall be the responsibility of the Contractor unless otherwise indicated in writing by the VA representative.

D. Shut down and seal with a minimum of 2 layers of 6 mil fire retardant poly all HVAC systems and critical openings in the regulated area. The regulated area critical barriers shall be completely isolate the regulated area from any other air in the building. The VA's representative will monitor the isolation provision.

E. Shut down and lock out in accordance with 29 CFR 1910.147 all electrical circuits which pose a potential hazard. Electrical arrangements will be tailored to the particular regulated area and the systems involved. All electrical circuits affected will be turned off at the circuit box outside the regulated area, not just the wall switch. The goal is to eliminate the potential for electrical shock which is a major threat to life in the regulated area due to water use and possible energized circuits. Electrical lines used to power equipment in the regulated area shall conform to all electrical safety standards and shall be isolated by the use of a ground fault circuit interrupter (GFCI). All GFCI shall be tested prior to use. The VA's representative will monitor the electrical shutdown.

F. If required, remove and dispose of carpeting from floors in the regulated area.

G. Inspect existing firestopping in the regulated area. Correct as needed.

3.1.3 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 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, Contractor's employees perform all major aspects of the approved SOP's, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.

C. The CPIH shall document the pre-abatement activities described above and deliver a copy to the VA representative.

D. Upon satisfactory inspection of the installation of and operation of systems the VA representative will notify the Contractor in writing to proceed with the Class II asbestos abatement work in accordance with these specifications and applicable regulations.

3.2 REGULATED AREA PREPARATIONS

3.2.1 OSHA DANGER SIGNS

Post OSHA DANGER signs meeting the requirements of OSHA 29 CFR 1926.1101 at approaches to the regulated area or other area(s) 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 personnel to read the sign and take the necessary measures to avoid exposure. Additional signs shall be posted following construction of the regulated area enclosure.

3.2.2 SHUT DOWN - LOCK OUT ELECTRICAL

Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Ensure 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.

3.2.3 SHUT DOWN - LOCK OUT HVAC

Shut down and lock 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 tape and 2 layers of 6-mil fire retardant poly sheeting. 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.

3.2.4 SANITARY FACILITIES

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

3.2.5 WATER FOR ABATEMENT

The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to shower(s) shall be supplied with backflow prevention.

3.2.6 PRE-CLEANING MOVABLE OBJECTS

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.

3.2.7 PRE-CLEANING FIXED OBJECTS

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. After precleaning, enclose fixed objects with 2 layers of 6-mil fire retardant poly sheeting and seal securely in place with 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 and coordinate with VA representative regarding any special protection requirements.

3.2.8 PRE-CLEANING SURFACES IN THE REGULATED 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.

3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA

3.3.1 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.

3.3.2 PREPARATION PRIOR TO SEALING OFF

Place all infrared machines, 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.

3.3.3 CONTROLLING ACCESS TO THE REGULATED AREA

Access to the regulated area shall be permitted only by the competent person. All other means of access shall be closed off by proper sealing and OSHA DANGER demarcation signs posted on the clean side of the

regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of 6 mil fire retardant poly sheeting shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with normal 2″ x 4″ (50mm x 100mm) wood or metal studs 16″ (400mm) on centers, securely anchored to prevent movement and covered with a minimum of ½″ (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

3.3.4 CRITICAL BARRIERS

The regulated area must be completely separated from the adjacent areas, and the outside by at least 2 layers of 6 mil fire retardant poly sheeting and 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 sheeting, and with tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed.

3.3.5 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 these specifications. 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 or less than 0.01 f/cc.

3.3.6 FLOOR BARRIERS

If floor removal is not being done, all floors in the regulated area shall be covered with 2 layers of 6 mil fire retardant poly and brought up the wall 12 inches.

3.4 REMOVAL OF CLASS II FLOORING MATERIALS:

3.4.1 GENERAL

All applicable requirements of OSHA, EPA, and DOT shall be followed during Class II work. Keep materials intact and adequately wet during

the removal process and wrap removed materials with a minimum of two layers of 6 mil plastic sheeting for disposal.

3.4.2 REMOVAL OF FLOORING MATERIALS:

A. All requirements of OSHA Flooring agreement provisions shall be followed:

1. Negative air equipment shall be installed to continuously maintain a minimum pressure differential of -0.02" water column gauge in the regulated area. Spare equipment shall be available.
2. Flooring shall be removed intact, as much as possible. Do not rip or tear flooring.
3. Mechanical chipping or sanding is not allowed.
4. Flooring shall be removed with an infra-red heating unit operated by trained personnel following the manufacturer's instructions.
5. Wet clean and HEPA vacuum the floor before and after removal of flooring.
6. Place a 6 mil poly layer 4' by 10' adjacent to the regulated area for use as a decontaminated area. All waste must be contained in the regulated area.
7. Package all waste in 6 mil poly lined fiberboard drums.

3.4.3 REMOVAL OF MASTIC

A. Mastic removal material must have a flash point above 140 degrees Fahrenheit.

B. The mastic removal material must be a "low odor" or "no odor" material.

C. Negative air equipment as required under flooring removal shall be provided.

D. Follow all manufacturers' instructions in the use of the mastic removal material.

E. Package all waste in 6 mil poly lined fiberboard drums.

F. Prior to application of any liquid material, check the floor for penetrations and seal before removing mastic.

3.5 DISPOSAL OF CLASS II WASTE MATERIAL:

3.5.1 GENERAL

Package and dispose of waste materials as per these specifications and applicable OSHA, EPA, and DOT regulations. Landfill requirements for packaging must also be met. Disposal of non-friable waste must be done in accordance with applicable regulations.

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.

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 cleaning of the regulated area surfaces 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 paragraph 3.7 of this Section.

3.6.3 WORK DESCRIPTION

Decontamination includes the cleaning and clearance of the air 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.

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 removal 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. CLEANING:

Clean all surfaces of the regulated area by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

3.7 VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.7.1 GENERAL

Notify the VA representative 24 hours in advance for the performance of visual inspection and testing. The visual inspection and testing will be performed by the VPIH/CIH following all cleaning activities.

3.7.2 VISUAL INSPECTION

Visual inspection will include the entire regulated area, 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 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 testing can be conducted.

3.7.3 AIR CLEARANCE TESTING

A. After an acceptable visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform testing.

B. **Coordinate with VA representative to determine whether flooring abatement and the abatement of other asbestos-containing materials (specified in Section 02 82 11 of these specifications) will be cleared together. Should flooring material abatement be cleared together with the other abated asbestos-containing materials, air clearance testing shall be conducted using transmission electron microscopy (TEM) as specified in Section 02 82 11. Should flooring material abatement be cleared independently of the other abated materials, air clearance samples will be collected and analyzed in accordance with procedures for PCM as set forth below.**

C. If the release criteria are not met, the Contractor shall repeat the cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Contractor.

D. If the results of the PCM are acceptable, remove the critical barriers. Any small quantities of residue material found upon removal of the poly shall be removed with a HEPA vacuum and localized isolation. If significant quantities are found as determined by the VPIH/CIH, then the entire area affected shall be cleaned as specified in the final cleaning.

E. 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 AIR CLEARANCE PROCEDURES (PCM)

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 with PCM methods.

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.
2. All clearance air testing samples shall be collected on 0.8μ MCE filters for PCM analysis. Air samples will be collected in areas subject to normal air circulation. A minimum of 5 PCM samples will be collected with at least 1200 Liters of air sampled. All results must be less than 0.01 f/cc for clearance.

3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.8.1 COMPLETION OF ABATEMENT WORK

A. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:

1. Remove all equipment, materials, and debris from the project area.
2. Package and dispose of all asbestos waste as required.
3. Repair or replace all interior finishes damaged during the abatement work.
4. Fulfill other project closeout requirements as specified elsewhere in this specification.

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

The CPIH 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.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE:

PROJECT NAME:

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.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

ATTACHMENT #2

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: Date:

   Printed Name of CPIH:

   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

Date

Date

- - - END- - - -

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

B. 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 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. Accompany request for approval of testing agency with a copy of Report of Latest Inspection of Laboratory Facilities by CCRL.

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

1.4 TOLERANCES

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

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

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

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

1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.
2. Maximum elevation change which may occur within 600 mm (2 feet) of any column or wall element is 6 mm (0.25 inches).

3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 1500 mm (5 feet).

1.5 REGULATORY REQUIREMENTS

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

1.6 SUBMITTALS

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

1.7 DELIVERY, STORAGE, AND HANDLING

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

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

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

1.8 PRE-CONCRETE CONFERENCE

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

B. Agenda: Includes but is not limited to:

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

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

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

1.9 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):

117-06.....Tolerances for Concrete Construction and Materials

211.1-02.....Selecting Proportions for Normal, Heavyweight, and Mass Concrete

211.2-04.....Selecting Proportions for Structural Lightweight Concrete

214R-02.....Evaluation of Strength Test Results of Concrete

301-05.....Structural Concrete
304R-2000.....Guide for Measuring, Mixing, Transporting, and Placing Concrete
305R-06.....Hot Weather Concreting
306R-(2002).....Cold Weather Concreting
308R-(2001).....Standard Practice for Curing Concrete
309R-05.....Guide for Consolidation of Concrete
31808.....Building Code Requirements for Reinforced Concrete and Commentary
347R-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.....Steel Wire, Plain, for Concrete Reinforcement
A185/185M-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A615/A615M-08.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
A706/A706M-06.....Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A767/A767M-05.....Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
A775/A775M-07.....Epoxy-Coated Reinforcing Steel Bars
A820-06.....Steel Fibers for Fiber-Reinforced Concrete
A996/A996M-06.....Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
C31/C31M-08.....Making and Curing Concrete Test Specimens in the field
C33-07.....Concrete Aggregates
C39/C39M-05.....Compressive Strength of Cylindrical Concrete Specimens
C94/C94M-07.....Ready-Mixed Concrete
C143/C143M-05.....Slump of Hydraulic Cement Concrete
C150-07.....Portland Cement
C171-07.....Sheet Materials for Curing Concrete

C172-07.....Sampling Freshly Mixed Concrete
C173-07.....Air Content of Freshly Mixed Concrete by the Volumetric Method
C192/C192M-07.....Making and Curing Concrete Test Specimens in the Laboratory
C231-08.....Air Content of Freshly Mixed Concrete by the Pressure Method
C260-06.....Air-Entraining Admixtures for Concrete
C309-07.....Liquid Membrane-Forming Compounds for Curing Concrete
C330-05.....Lightweight Aggregates for Structural Concrete
C494/C494M-08.....Chemical Admixtures for Concrete
C496-06.....Splitting Tensile Strength of Cylindrical Concrete Specimens
C567-05.....Density of Structural Lightweight Concrete
C618-08.....Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
C666/C666M-03.....Resistance of Concrete to Rapid Freezing and Thawing
C881/C881M-02.....Epoxy-Resin-Base Bonding Systems for Concrete
C1107/1107M-07.....Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
C1315-08 .....Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
D6-95(R2006).....Loss on Heating of Oil and Asphaltic Compounds
D297-93(R2006).....Rubber Products-Chemical Analysis
D1751-04.....Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
D4397-02.....Polyethylene Sheeting for Construction, Industrial and Agricultural Applications
E1155-96(R2008).....Determining F_F Floor Flatness and F_L Floor Levelness Numbers

E. American Welding Society (AWS):
D1.4-05.....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. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.

D. 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.

E. 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. Lightweight Aggregates for Structural Concrete: ASTM C330, Table 1. Maximum size of aggregate not larger than one-fifth of narrowest dimension between forms, nor three-fourth of minimum clear distance between reinforcing bars. Contractor to furnish certified report to verify that aggregate is sound and durable, and has a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666.

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

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

G. 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.

H. Vapor Barrier: ASTM D4397, 0.25 mm (10 mil).

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

J. Welded Wire Fabric: ASTM A185.

K. Reinforcing Bars to be Welded: ASTM A706.

L. Reinforcement for Metal Pan Stair Fill: 50 mm (2 inch) wire mesh, either hexagonal mesh at .8Kg/m^2 (1.5 pounds per square yard), or square mesh at .6Kg/m^2 (1.17 pounds per square yard).

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

N. Expansion Joint Filler: ASTM D1751.

O. Sheet Materials for Curing Concrete: ASTM C171.

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

Q. Moisture Vapor Emissions & Alkalinity Control Sealer: 100% active colorless aqueous siliconate solution concrete surface treatment applied the day of the concrete pour in lieu of other curing methods for all concrete slabs receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, carpet, epoxy coatings and overlays .

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.

MVE 15-Year Warranty
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.

R. 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.

S. Adhesive Binder: ASTM C881.

1. Polyvinyl Chloride Waterstop: CRD C572.
2. Rubber Waterstops: CRD C513.
3. Bentonite Water Stop: 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. Porous Backfill: Crushed stone or gravel graded from 25 mm to 20 mm (1 inch to 3/4 inch).
5. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and 0.9 kg/m^3 (1.5 lb. per cubic yard). Product shall have a UL rating.
6. Steel Fibers: ASTM A820, Type I cold drawn high tensile steel wire for use as primary reinforcing in slab-on-grade. Minimum dosage rate 18 kg/m^3 (30 lb. per cubic yard).
7. Epoxy Joint Filler: Two component, 100 percent solids compound, with a minimum shore D hardness of 50.
8. Bonding Admixture: Non-rewettable, polymer modified, bonding compound.
9. Architectural Concrete: For areas designated as architectural concrete on the Contract Documents, use colored cements and specially selected aggregates as necessary to produce a concrete of a color and finish which exactly matches the designated sample panel.

2.3 CONCRETE MIXES

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

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per m^3

(cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement -fly ash ratio, and consistency of each cylinder in terms of slump. Include dry unit weight of lightweight structural concrete.

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. 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.

C. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Fly ash may be substituted for up to 20 percent of the minimum cement factor at option of Contractor.

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. Lightweight Structural Concrete. Pump mixes may require higher cement values.
3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.

* Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

D. 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)

* 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.

E. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Air-entrainment of lightweight structural concrete shall conform with Table IV. 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	

TABLE IV
AIR CONTENT OF LIGHTWEIGHT STRUCTURAL CONCRETE

Nominal Maximum size of Total Air Content	Coarse Aggregate, mm's (Inches) Percentage by Volume
Greater than 10 mm (3/8 in) 4 to 8	10 mm (3/8 in) or less 5 to 9

F. 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.

G. Lightweight structural concrete shall not weigh more than air-dry unit weight shown. Air-dry unit weight determined on 150 mm by 300 mm (6 inch by 12 inch) test cylinders after seven days standard moist curing followed by 21 days drying at 23 degrees C ± 1.7 degrees C (73.4 ± 3 degrees Fahrenheit), and 50 (plus or minus 7) percent relative humidity. Use wet unit weight of fresh concrete as basis of control in field.

H. 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).

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

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question

as to the safety of the structure, Resident Engineer may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.

4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, Resident Engineer may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.
5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Resident Engineer.

2.4 BATCHING AND MIXING

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

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

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the Resident Engineer for consultation during batching, mixing, and placing operations of 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.

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 are 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 and ACI 315, 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 315. 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 MOISTURE VAPOR EMISSIONS & ALKALINITY CONTROL SEALER

A. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete

slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, carpet, epoxy coatings and overlays.

B. Manufacturer's representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.

1. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.
2. Spray apply Sealer at the rate of 20 m^2 (200 square feet) per gallon. Lightly broom product evenly over the substrate and product has completely penetrated the surface.
3. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply Sealer product to these areas as soon as weather condition permits.

3.5 CONSTRUCTION JOINTS

A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Resident Engineer.

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.

E. Install polyvinyl chloride or rubber water seals, as shown in accordance with manufacturer's instructions, to form continuous watertight seal.

3.6 EXPANSION 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.

3.7 PLACING CONCRETE

A. Preparation:
   1. Remove hardened concrete, wood chips, shavings and other debris from forms.
   2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
   3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
   4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
   1. Preparing surface for applied topping:
      a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
      b. Broom clean and keep base slab wet for at least four hours before topping is applied.
      c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete 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 it's 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.
      1) 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.

3.8 HOT WEATHER

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.9 COLD WEATHER

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

3.10 PROTECTION AND CURING

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage $10m^2/L$ (400 square feet per gallon) on steel troweled surfaces and $7.5m^2/L$ (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.

3.11 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. // For post-tensioned systems supporting forms and shoring not removed until stressing is completed. // Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

3.12 CONCRETE SURFACE PREPARATION

A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as

specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.

C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.13 CONCRETE FINISHES

A. Vertical and Overhead Surface Finishes:

1. Unfinished areas: Vertical and overhead concrete surfaces exposed in pipe basements, elevator and dumbwaiter shafts, pipe spaces, pipe trenches, above suspended ceilings, manholes, and other unfinished areas will not require additional finishing.
2. Interior and exterior exposed areas to be painted: Remove fins, burrs and similar projections on surfaces flush, and smooth by mechanical means approved by Resident Engineer, and by rubbing lightly with a fine abrasive stone or hone. Use ample water during rubbing without working up a lather of mortar or changing texture of concrete.
3. Interior and exterior exposed areas finished: Give a grout finish of uniform color and smooth finish treated as follows:
   a. After concrete has hardened and laitance, fins and burrs removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone stone.
   b. Apply grout composed of one part of Portland cement, one part fine sand, smaller than a 600 µm (No. 30) sieve. Work grout into surface of concrete with cork floats or fiber brushes until all pits, and honeycombs are filled.
   c. After grout has hardened slightly, but while still plastic, scrape grout off with a sponge rubber float and, about 1 hour later, rub concrete vigorously with burlap to remove any excess grout remaining on surfaces.
   d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish of area in same day. Make limits of finished areas at natural breaks in wall surface. Leave no grout on concrete surface overnight.
4. Textured: Finish as specified. Maximum quantity of patched area 0.2 m^2 (2 square feet) in each 93 m^2 (1000 square feet) of textured surface.

B. Slab Finishes:

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.
2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. 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:

       Slab on Grade:

Specified overall value	F_F 25/F_L 20
Minimum local value	F_F 17/F_L 15

       Level suspended slabs (shored until after testing) and topping slabs:

Specified overall value	FF 25/FL 20
Minimum local value	FF 17/FL 15

Unshored suspended slabs:
Specified overall value FF 25
Minimum local value FF 17
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:
Slab on grade:
Specified overall value FF 36/FL 20
Minimum local value FF 24/FL 15
Level suspended slabs (shored until after testing) and topping slabs
Specified overall value FF 30/FL 20
Minimum local value FF 24/FL 15
Unshored suspended slabs:
Specified overall value FF 30
Minimum local value FF 24
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 F_F, F_L, 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 F_F and F_L 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, planning, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

3.14 SURFACE TREATMENTS

A. Use on exposed concrete floors and concrete floors to receive carpeting.

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SECTION 03 52 00
LIGHTWEIGHT CONCRETE ROOF INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

Section specifies insulating concrete placed on a prepared structural deck and integral insulating board composite construction.

1.2 RELATED WORK

A. Steel Decking: Section 05 31 00 Steel Decking.

B. SBS Modified Bitumen Roofing System: 07 52 16 SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

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 material.
2. Specifications for mixing, placing, curing and protection of insulating concrete.

C. Certificates:

1. Submit a sample copy of the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system.
2. Submit a letter from the roof membrane manufacturer confirming the intention to issue the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system at project completion.
3. Submit a letter from the proposed lightweight insulating concrete system supplier confirming that the Contractor is approved to install the proposed lightweight insulating concrete system.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact.

B. Store in dry and watertight facilities. Do not store materials on ground.

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 Concrete Institute (ACI):

305R-99.....Hot Weather Concreting

306R-(R02).....Cold Weather Concreting

308-(R01).....Curing Concrete

523.1R-06.....Guide for Cast-in-Place Low-Density Concrete

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

A82/A80M-07.....Steel Wire, Plain, for Concrete Reinforcement

A185/A185M-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

C150-07.....Portland Cement

C260-06.....Air-Entraining Admixtures for Concrete

C309-07.....Liquid Membrane Forming Compounds for Curing Concrete

C332-07.....Lightweight Aggregates for Insulating Concrete

C495-07.....Compressive Strength of Lightweight Insulating Concrete

C578-08b.....Rigid Cellular Polystyrene Thermal Insulation

C665-06.....Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C796-04.....Foaming Agents For Use in Producing Cellular Concrete Using Preformed Foam

C869-91(R06).....Foaming Agents Used in Making Preformed Foam for Cellular Concrete

1.6 QUALITY ASSURANCE

A. Acceptable Contractor: The contractor must be certified in writing prior to bid by the supplier to install the proposed lightweight insulating concrete system.

B. Agency Approvals: The proposed lightweight insulating concrete system shall conform to the following requirements. No other testing agency approvals will be accepted.

1. Underwriters Laboratories: Tested by Underwriters Laboratories in accordance with the procedures of ASTM E 119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory. Lightweight insulating concrete roof insulation components are defined by Underwriters Laboratories under sections CCVW for foamed plastic and CJZZ for floor or roof - topping mixture in the latest

edition of the Underwriters Laboratories Fire Resistance Directory.

2. Factory Mutual: Tested by Factory Mutual Research and listed in FM Global RoofNav as non-combustible or Class 1, and for 1-120 windstorm classification utilizing the specific roof membrane system proposed for use on this project.

1.7 WARRANTY:

A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except as noted herein

B. Provide roof system manufacturer's 20 year labor and materials roof system guarantee. The roof system guarantee shall include both the roofing and flashing membranes, and the specified new lightweight insulating concrete system consisting of aggregate fill, patented-pre-formed polystyrene panels, and base sheet fasteners. All repair or replacement costs covered under the guarantee shall be borne by the roofing membrane manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Government. Specific items covered under the roof system guarantee include:

1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks;
2. Should a roof leak occur, the insulating performance of the roof insulation will be at least 80% of the design thermal resistance within a 2 year period following repair of the leak.
3. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)
4. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

5. Warranty shall be a No Dollar Limit (NDL) and not a prorated warranty.

C. Contractor shall provide a renewable 2-year workmanship warranty on all work performed.

PART 2 - PRODUCTS

Provide a lightweight insulating concrete roof insulation system incorporating vermiculite aggregate and expanded polystyrene board supplied by a single manufacturer equal to ZIC 1:4 Roof Insulation System by Siplast.

2.1 MATERIALS

A. Portland cement: ASTM C150, Type I or Type III.

B. Lightweight Aggregate: Vermiculite conforming to ASTM C332, Group I.

C. Foaming Agent: ASTM C869.

D. Air-Entrainment Agent:

1. ASTM C260 type recommended by the aggregate manufacturer.
2. Admixtures with chloride salts or regenerated foam types not acceptable.

E. Water: Clean and potable, free from impurities detrimental to the concrete.

F. Insulation and Control Joint Filler:

1. Control Joint Filler: Glass fiber or similar vapor permeable highly compressible material which will compress to one-half its thickness under a load of 172 kPa (25 psi) or less.
2. Insulation: ASTM C665, unfaced for relief vents.
   a. Use wire mesh reinforcing when roof deck slopes exceed 4 inches in 12 inches and for fire rated roof assemblies using metal decking.
3. Insulation Board:
   a. Expanded Polystyrene Insulation Board equal to Insulperm Insulation Board by Siplast: Expanded polystyrene (EPS) insulation board having a nominal density of 1 pcf (16 kg/m³) defined as Type I by ASTM C 578 and containing approximately 3% open area. Each bundle of board shall be delivered to the job site with clear identification as to manufacturer and

shall carry the Factory Mutual approval label and the Underwriter's Laboratories Classified label on each bundle.

G. Reinforcing Mesh

1. Hexagonal Mesh: Fabricated of ASTM A82, galvanized steel wire 0.91 mm (0.0359-inch) diameter twisted to form 51 mm (2-inch) hexagons with WO.5 galvanized steel wire woven into mesh spaced 457 mm (18-inches) apart.
2. Welded wire fabric: ASTM A185, 102 x 203 mm (4 by 8-inches) - W1.2/W05 - or 51 x 51 mm (2 by 2-inches) - W05/W0.5.

H. Admixtures:

1. Air Entraining: ASTM C260, Type recommended by the aggregate manufacturer. Admixtures with chloride salts or pregenerated foam types are not acceptable for vermiculite or perlite concrete.
2. Accelerating, Retarding, and Water Reducing: ASTM C494, Type as recommended by insulating concrete manufacturer.

I. Concrete Sealer: ASTM C309, Type 2, white, pigmented, curing, sealing, hardening and dustproofing concrete, and compatible with latex paint or acrylic paint, not acting as a bond breaker for the paint.

J. Galvanized Metal Deck: Corrugated steel decking incorporating a pre-applied galvanized coating conforming to a minimum Class G-60 as specified in ASTM A 525 and having slots in the flutes equal to a minimum of 0.75% of the deck area. Refer to general notes on the structural drawings and Specification Section 053100 for steel decking specifications and attachment requirements.

2.2 MIXES AND MIXING

Roof Deck

A. Mix insulating concrete in accordance with ACI 523.1R or manufacturer's printed specifications where more demanding.

B. Place in accordance with chapter 5 of ACI 523.1R, or manufacturer's specifications where more demanding.

1. Cold Weather Concreting: ACI 306R and ACI 523.1R. Remove and replace frozen concrete.
2. Hot Weather Concreting ACI 305R.
3. Place insulating concrete to not less than 89 mm (3-1/2 inches) over the top of the steel deck crests.
4. Smooth the placed material to a uniform finish following the screeding operation.

5. Free surface of loose material, finish smooth to receive sealer.

C. Design Mix:

1. Compressive strength: Minimum 130 kPa (200 psi) when tested in accordance with ASTM C495 except do not oven dry cellular concrete samples.
2. Dry density: Maximum 593 Kg / cubic meter (31-37 lb / cubic foot).

D. Vermiculite aggregate mix.

1. Mix proportions as recommended by aggregate manufacturer for specified strength and density.
2. Approximate proportions:
   a. Ratio of 0.17 cubic meter (6 cubic feet) of aggregate to 43 Kg (94 pounds) of Portland cement.
   b. Air entraining agent approximately 0.05 Kg (0.11 pound) per 95 L (25 gallons) of water.
   c. Slump approximately 69 mm (2.7 inches).
   d. Water to assure uniform and consistent mix.

at approximately 40 parts water to one part concentrate.

PART 3 - EXECUTION

3.1 INSPECTION

A. Clean deck of debris, oil, and other contaminants that will prevent bond.

B. Do not start until curbs, sleeves, edge venting, or other penetration forms are completed.

3.2 PLACING INSULATING CONCRETE

A. Place in accordance with ACI 523.1R or manufacturer's specifications where more demanding.

B. Cold Weather Concreting: ACI 306R.
Remove and replace frozen concrete.

C. Hot Weather Concreting: ACI 305R.

D. Place reinforcement as required for fire rating and for seismic areas.

1. Lap the edges of the reinforcement 152 mm (6-inches) and the ends 152 mm (6-inches).
2. Locate at mid-height of insulating concrete.

3. Place reinforcement without attachment approximately 13 mm (1/2 inch) above steel deck crests in insulating concrete.

E. Place for thickness and profiles shown.

F. Place concrete not less than 51 mm (2-inches), or more than 203 mm (8-inches) in thickness.

G. Slope insulating concrete uniformly, 1 in 50 (1/4-inch per foot) minimum, to drains or scuppers.

H. Depressions that create ponding are not acceptable.

I. Leave surface free of loose material and finish to receive roofing material specified.

J. Vent insulating concrete placed on steel deck at underside through slotted holes formed in metal deck, combined with topside edge venting and roof relief vents unless ASHRAE recommends no topside roof venting.

K. Vent insulating concrete placed over cast-in-place concrete or precast concrete substrates, through topside roof relief vents combined with edge venting unless ASHRAE recommends no roof venting.

L. Roof relief Vents for Vermiculite Concrete:

1. Under roof relief vents, remove insulating concrete to structural deck and fill with ASTM C665 insulating material.
2. Coordinate with roofing and sheet metal work to space vents minimum 152 mm (6-inches) in diameter, a maximum distance of 9 m (30 feet) from adjacent vent and from vented edge.

M. Thermal Resistance: Install the specified lightweight insulation concrete system to provide for a minimum average thermal value of R-19 or as shown on architectural drawings/details.

N. Use cellular insulating concrete for adhesively applied single ply roofing.

O. Define as "Insulating Concrete" on drawings. Do not use term "Light Weight Insulating Concrete".

3.3 PLACING INSULATION BOARD FOR COMPOSITE CONSTRUCTION

A. Coat concrete roof deck with a slurry of the insulating concrete, minimum 3 mm (1/8-inch) thick.

B. Fill the corrugations of metal decking with insulating concrete to a minimum depth of 3 mm (1/8-inch) over top of flutes.

C. Set insulation boards to key into slurry. Install insulation in a stair stepped configuration to form base for slope-to-drain capability.

D. Place for thickness and profiles shown. Thickness of concrete over insulation board not less than 2 inches.

3.4 CURING, PROTECTION AND TESTING

A. Roof Deck: Cure in accordance with ACI 308R, or manufacturer's specification where more demanding.

B. Do not permit traffic on insulating concrete for 72 hours after placing.

C. Testing:

1. Fasteners pull-out test for roofing: Resist a 18 kg (40 pound) pull-out when driven into cured insulating concrete.
2. Perform roof fastener pull-out test for each 160 square meters (10 squares) or not less than 3 tests whichever is greater.
3. Patch test pull out areas after fastener is removed.
4. Selection of test location and witness of tests by Resident Engineer.
5. Take a minimum of 4 test specimens at the point of placement for 76 m^3 (100 cubic yards) of material placed and each days pour.
6. Use 76 mm x 152 mm (3 inch by 6 inch) cylinders for specimens.
7. Test for compressive strength in accordance with ASTM C495 except do not oven dry cellular insulating concrete prior to compressive testing, see ASTM C796, Section 8.9.

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SECTION 04 05 13
MASONRY MORTARING

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies mortar materials and mixes.

1.2 RELATED WORK:

A. Mortar used in Section:
   1. Section 04 05 16, MASONRY GROUTING.
   2. Section 04 20 00, UNIT MASONRY.
   3. Section 04 05 31, MASONRY TUCK POINTING.

1.3 TESTING LABORATORY-CONTRACTOR RETAINED

A. Engage a commercial testing laboratory approved by Resident Engineer to perform tests specified below.
B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Resident Engineer.

1.4 TESTS

A. Test mortar and materials specified.
B. Certified test reports.
C. Identify materials by type, brand name and manufacturer or by origin.
D. Do not use materials until laboratory test reports are approved by Resident Engineer.
E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.
F. Testing:
   1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
   2. Mortar:
      a. Test for compressive strength and water retention; ASTM C270.
      b. Mortar compressive strengths 28 days as follows:
         Type M: Minimum 17230 kPa (2500 psi) at 28 days.
         Type S: Minimum 12400 kPa (1800 psi) at 28 days.
         Type N: Minimum 5170 kPa (750 psi) at 28 days.
   3. Cement:
      a. Test for water soluble alkali (nonstaining) when nonstaining cement is specified.
      b. Nonstaining cement shall contain not more than 0.03 percent water soluble alkali.
   4. Sand: Test for deleterious substances, organic impurities, soundness and grading.

G. During progress of work, testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES, takes and tests samples as specified in that section. Testing procedures and test methods in ASTM C780.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Certificates:

1. Testing laboratory's facilities and qualifications of its technical personnel.
2. Indicating that following items meet specifications:
   a. Portland cement.
   b. Masonry cement.
   c. Mortar cement.
   d. Hydrated lime.
   e. Fine aggregate (sand).

C. Laboratory Test Reports:

1. Mortar, each type.
2. Admixtures.

D. Manufacturer's Literature and Data:

1. Cement, each kind.
2. Hydrated lime.
3. Admixtures.
4. Liquid acrylic resin.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.

B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

1.7 APPLICABLE PUBLICATIONS

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

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

C40-04.....Organic Impurities in Fine Aggregates for Concrete
C91-05.....Masonry Cement
C109-07.....Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-MM Cube Specimens)
C144-04.....Aggregate for Masonry Mortar
C150-05.....Portland Cement

C207-06.....Hydrated Lime for Masonry Purposes
C270-07.....Mortar for Unit Masonry
C307-03.....Tensile Strength of Chemical - Resistant Mortar, Grouts, and Monolithic Surfacing
C321-00/R05.....Bond Strength of Chemical-Resistant Mortars
C348-02.....Flexural Strength of Hydraulic Cement Mortars
C595-08.....Blended Hydraulic Cement
C780-07.....Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C979-05.....Pigments for Integrally Colored Concrete
C1329-05.....Mortar Cement

PART 2 - PRODUCTS

2.1 HYDRATED LIME

ASTM C207, Type S.

2.2 AGGREGATE FOR MASONRY MORTAR

A. ASTM C144 and as follows:
   1. Light colored sand for mortar for laying face brick.
B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

2.3 BLENDED HYDRAULIC CEMENT

ASTM C595, Type IS, IP.

2.4 MASONRY CEMENT

A. ASTM C91. Type N, S, or M.

2.5 MORTAR CEMEMT

ASTM C1329, Type N, S or M.

2.6 PORTLAND CEMENT

A. ASTM C150, Type I.

2.7 WATER

Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.8 POINTING MORTAR

A. For Cast Stone or Precast Concrete: Proportion by volume; One part white Portland cement, two parts white sand, and 1/5 part hydrated lime.

2.9 MASONRY MORTAR

A. Conform to ASTM C270.
B. Admixtures:
   1. Do not use mortar admixtures, and color admixtures unless approved by Resident Engineer.
   2. Submit laboratory test report showing effect of proposed admixture on strength, water retention, and water repellency of mortar.

3. Do not use antifreeze compounds.

C. Colored Mortar:

1. Maintain uniform mortar color for exposed work throughout.
2. Match mortar color in approved sample
3. Color of mortar for exposed work in alteration work to match color of existing mortar unless specified otherwise.

D. Color Admixtures:

1. Proportion as specified by manufacturer.

2.10 COLOR ADMIXTURE

A. Pigments: ASTM C979.

B. Use mineral pigments only. Organic pigments are not acceptable.

C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

PART 3 - EXECUTION

3.1 MIXING

A. Mix in a mechanically operated mortar mixer.

1. Mix mortar for at least three minutes but not more than five minutes.

B. Measure ingredients by volume. Measure by the use of a container of known capacity.

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 that has stiffened because of loss of water through evaporations:

1. Re-tempered by adding water to restore to proper consistency and workability.
2. Discard mortar that has reached its initial set or has not been used within two hours.

3.2 MORTAR USE LOCATION

A. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered) masonry below grade and engineered reinforced unit masonry work.

B. For brick veneer over frame back up walls, use Type N portland cement-lime mortar or Type S masonry cement or mortar cement mortar.

C. Use Type N mortar for other masonry work, except as otherwise specified.

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SECTION 04 05 16
MASONRY GROUTING

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies grout materials and mixes.

1.2 RELATED WORK:

A. Grout used in Section:
   1. Section 04 20 00, UNIT MASONRY.

1.3 TESTS:

A. Test grout and materials specified.
B. Certified test reports.
C. Identify materials by type, brand name and manufacturer or by origin.
D. Do not use materials until laboratory test reports are approved by Resident Engineer.
E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.
F. Testing:
   1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
   2. Grout:
      a. Test for compressive strength; ASTM C1019.
      b. Grout compressive strength of 13790 kPa (2000 psi) at 28 days.
   3. Sand: Test for deleterious substances, organic impurities, soundness and grading.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Certificates:
   1. Indicating that following items meet specifications:
      a. Portland cement.
      b. Masonry cement.
      c. Grout.
      d. Hydrated lime.
      e. Fine aggregate (sand).
      f. Coarse aggregate for grout.
      g. Color admixture.
C. Laboratory Test Reports:
   1. Grout, each type.
   2. Admixtures.

D. Manufacturer's Literature and Data:
   1. Cement, each kind.
   2. Hydrated lime.
   3. Admixtures.
   4. Liquid acrylic resin.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.

B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

1.6 APPLICABLE PUBLICATIONS:

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

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

C40-04.....Organic Impurities in Fine Aggregates for Concrete
C91-05.....Masonry Cement
C150-05.....Portland Cement
C207-06.....Hydrated Lime for Masonry Purposes
C404-07.....Aggregate for Masonry Grout
C476-07.....Grout for Masonry
C595-08.....Blended Hydraulic Cement
C979-05.....Pigments for Integrally Colored Concrete
C1019-05.....Sampling and Testing Grout

PART 2 - PRODUCTS

2.1 HYDRATED LIME:

ASTM C207, Type S.

2.2 AGGREGATE FOR MASONRY GROUT:

ASTM C404, Size 8.

2.3 BLENDED HYDRAULIC CEMENT:

ASTM C595, Type IS, IP.

2.4 MASONRY CEMENT:

A. ASTM C91. Type N, S, or M.

2.5 PORTLAND CEMENT:

A. ASTM C150, Type I.

2.6 WATER:

Potable, free of substances that are detrimental to grout, masonry, and metal.

2.7 GROUT:

A. Conform to ASTM C476 except as specified.

B. Grout type proportioned by volume as follows:

1. Fine Grout:
   a. Portland cement or blended hydraulic cement: one part.
   b. Hydrated lime: 0 to 1/10 part.
   c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
2. Coarse Grout:
   a. Portland cement or blended hydraulic cement: one part.
   b. Hydrated lime: 0 to 1/10 part.
   c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
   d. Coarse aggregate: one to two times sum of volumes of cement and lime used.
3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

2.8 COLOR ADMIXTURE:

A. Pigments: ASTM C979.

B. Use mineral pigments only. Organic pigments are not acceptable.

C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

PART 3 - EXECUTION

3.1 MIXING:

A. Mix in a mechanically operated grout mixer.
   1. Mix grout for at least five minutes.

B. Measure ingredients by volume. Measure by the use of a container of known capacity.

C. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.

3.2 GROUT USE LOCATIONS:

A. Use fine grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is 50 mm (2 inches) or less.

B. Use either fine grout or coarse grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is greater than 50 mm (2 inches).

C. Do not use grout for filling bond beam or lintel units.

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SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies requirements for construction of masonry unit walls (face brick).

B. At Contractor's option:

- Use existing brick (to be covered by new construction)to be re-used for new construction as shown on drawings, to ensure size and color match with existing.
- Provide new brick that would match size and color with the existing.

1.2 RELATED WORK

A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING.

B. Steel lintels and shelf angles: Section 05 50 00, METAL FABRICATIONS.

C. Cavity insulation: Section 07 21 13, THERMAL INSULATION.

D. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.

E. Sealants and sealant installation: 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. Samples:

1. Face brick, sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
2. Concrete masonry units, when exposed in finish work.
3. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.

C. Shop Drawings:

1. Special masonry shapes.
2. Drawings, showing reinforcement, applicable dimensions and methods of hanging soffit or lintel masonry and reinforcing masonry for embedment of anchors for hung fixtures.
3. Shop Drawings: Submit shop drawings for 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 as required for fabrication and placement of reinforcement for unit masonry work.

D. Certificates:

1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.
2. Indicating that the following items meet specification requirements:
   a. Face brick.
   b. Solid and load-bearing concrete masonry units, including fire-resistant rated units.
3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.

E. Laboratory Test Reports:
1. Brick for pre-built masonry panels.

F. Manufacturer's Literature and Data:
1. Anchors, ties, and reinforcement.
2. Shear keys.
3. Reinforcing bars.

1.4 SAMPLE PANEL

A. Before starting masonry, lay up a sample panel in accordance with Masonry Standards Joint Committee (MSJC) and Brick Industry Association (BIA).
1. Use masonry units from random cubes of units delivered on site.
2. Include reinforcing, ties, and anchors.

B. Use sample panels approved by Resident Engineer for standard of workmanship of new masonry work.

C. Use sample panel to test cleaning methods.

1.5 WARRANTY

Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

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. American Society for Testing and Materials (ASTM):

A951-06.....Steel Wire for Masonry Joint Reinforcement.

A615/A615M-08b.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

A675/A675M-03e1.....Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties C34-03 Structural Clay Load-Bearing Wall Tile

C55-06e1.....Concrete Building Brick

C62-08.....Building Brick (Solid Masonry Units Made From Clay or Shale)
C67-07a.....Sampling and Testing Brick and Structural Clay Tile
C90-08.....Load-Bearing Concrete Masonry Units
C216-07a.....Facing Brick (Solid Masonry Units Made From Clay or Shale)
C476-08.....Standard Specification for Grout for Masonry
C612-04e1.....Mineral Fiber Block and Board Thermal Insulation
D3574-08.....Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams
F1667-05.....Fasteners: Nails, Spikes and Staples

C. Masonry Industry Council:
All Weather Masonry Construction Manual, 2000.

D. American Welding Society (AWS):
D1.4-05 Structural Welding Code – Reinforcing Steel.

E. Federal Specifications (FS):
FF-S-107C-00.....Screws, Tapping and Drive

F. Brick Industry Association - Technical Notes on Brick Construction (BIA):
11-2001.....Guide Specifications for Brick Masonry, Part I
11A–1988.....Guide Specifications for Brick Masonry, Part II
11B–1988.....Guide Specifications for Brick Masonry, Part III Execution
11C-1998.....Guide Specification for Brick Masonry Engineered Brick Masonry, Part IV
11D-1988.....Guide Specifications for Brick Masonry Engineered Brick Masonry, Part IV continued

G. Masonry Standards Joint Committee; Specifications for Masonry Structures (ACI 530.1-05/ASCE 6-05/TMS 602-99) (MSJC).

PART 2 – PRODUCTS

2.1 BRICK

A. Face Brick:
1. ASTM C216, Grade SW, Type FBS.
2. Brick when tested in accordance with ASTM C67: Classified slightly efflorescent or better.
3. Size: to match existing.

B. Building Brick: ASTM C62, Grade MW for backup and interior work; Grade SW where in contact with earth.

2.2 CONCRETE MASONRY UNITS

A. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.
   1. Unit Weight: normal weight.
   2. Fire rated units for fire rated partitions.
   3. Sizes: Modular.
   4. Color & pattern: to match existing.

2.3 REINFORCEMENT:

A. Steel Reinforcing Bars: ASTM A615, deformed bars, 420 MPa (Grade 60) for bars No. 10 to No. 57 (No. 3 to No. 18), except as otherwise indicated.

B. Where 6 mm diameter (No. 2) bars are shown, provide plain, round, carbon steel bars, ASTM A675, 550 MPa (Grade 80).

C. Shop-fabricate reinforcement bars which are shown to be bent or hooked.

D. Joint Reinforcement:
   1. Form from wire complying with ASTM A951.
   2. Galvanized after fabrication.
   3. Width of joint reinforcement 40 mm (1 5/8-inches) less than nominal width of masonry wall or partition.
   4. Cross wires welded to longitudinal wires.
   5. Joint reinforcing at least 3000 mm (10 feet) in length.
   6. Joint reinforcing in rolls is not acceptable.
   7. Joint reinforcing that is crimped to form drip is not acceptable.
   8. Maximum spacing of cross wires 400 mm (16 inches) to longitudinal wires.
   9. Ladder Design:
      a. Longitudinal wires deformed 4 mm (0.16 inch) diameter wire.
      b. Cross wires 2.6 mm (0.10 inch diameter.
   10. Trussed Design:
      a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
      b. Longitudinal wires deformed.
   11. Multiple Wythes and Cavity wall ties:
      a. Longitudinal wires 2.6 mm (0.10 inch), two in each wythe with ladder truss wires 2.6 mm (0.10 inch) overlay, welded to each longitudinal wire.
      b. Longitudinal wires 4 mm (0.16 inch) with U shape 2.6 mm (0.10 inch) rectangular ties extending into other wythe not less than 75 mm (3 inches) spaced 400 mm o.c. (16 inches). Adjustable type with

U shape tie designed to receive 4 mm (0.16 inch) pintle projecting into other wythe 75 mm (3 inches) minimum.

2.4 ANCHORS, TIES, AND REINFORCEMENT

A. Steel Reinforcing Bars: ASTM A615M, deformed bars, grade as shown.

B. Joint Reinforcement:

1. Form from wire complying with ASTM A951.
2. Galvanized after fabrication.
3. Width of joint reinforcement 40 mm (0.16 inches) less than nominal width of masonry wall or partition.
4. Cross wires welded to longitudinal wires.
5. Joint reinforcement at least 3000 mm (10 feet) in length.
6. Joint reinforcement in rolls is not acceptable.
7. Joint reinforcement that is crimped to form drip is not acceptable.
8. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
9. Ladder Design:
   a. Longitudinal wires deformed 4 mm (0.16 inch) diameter wire.
   b. Cross wires 2.6 mm (0.10 inch) diameter.
10. Trussed Design:
    a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
    b. Longitudinal wires deformed.
11. Multiple Wythes and Cavity wall ties:
    a. Longitudinal wires 4 mm (0.16 inch), two in each wythe with ladder truss wires 4 mm (0.16 inch) overlay, welded to each longitudinal wire.
    b. Longitudinal wires 4 mm (0.16 inch) with U shape 4 mm (0.16 inch) rectangular ties extending into other wythe not less than 75 mm (3 inches) spaced 400 mm o.c. (16 inches). Adjustable type with U shape tie designed to receive 4 mm (0.16 inch) pintle projecting into other wythe 75 mm (3 inches min.).

C. Adjustable Veneer Anchor for Frame Walls:

1. Two piece, adjustable anchor and tie.
2. Anchor and tie may be either type; use only one type throughout.
3. Loop Type:
   a. Anchor: Screw-on galvanized steel anchor strap 2.75 mm (0.11 inch) by 19 mm (3/4 inch) wide by 225 mm (9 inches) long, with 9 mm (0.35 inch) offset and 100 mm (4 inch) adjustment. Provide 5 mm (0.20 inch) hole at each end for fasteners.

b. Ties: Triangular tie, fabricated of 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Ties long enough to engage the anchor and be embedded not less than 50 mm (2 inches) into the bed joint of the masonry veneer.

4. Angle Type:
   a. Anchor: Minimum 2 mm (16 gage) thick galvanized steel angle shaped anchor strap. Provide hole in vertical leg for fastener. Provide hole near end of outstanding leg to suit upstanding portion of tie.
   b. Tie: Fabricate from 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Form "L" shape to be embedded not less than 50 mm (2 inches) into the bed joint of the masonry veneer and provide upstanding leg to fit through hole in anchor and be long enough to allow 50 mm (2 inches) of vertical adjustment.

D. Individual ties:
   1. Rectangular ties: Form from 5 mm (3/16 inch) diameter galvanized steel rod to a rectangular shape not less than 50 mm (2 inches) wide by sufficient length for ends of ties to extend within 25 mm (1 inch) of each face of wall. Ties that are crimped to form drip are not permitted.
   2. Adjustable Cavity Wall Ties:
      a. Adjustable wall ties may be used at Contractor's option.
      b. Two piece type permitting up to 40 mm (1-1/2 inch) adjustment.
      c. Form ties from 5 mm (3/16 inch) diameter galvanized steel wire.
      d. Form one piece to a rectangular shape 105 mm (4-1/8 inches) wide by length required to extend into the bed joint 50 mm (2 inches).
      e. Form the other piece to a 75 mm (3 inch) long by 75 mm (3 inch) wide shape, having a 75 mm (3 inch) long bent section for engaging the 105 mm (4-1/8 inch) wide piece to form adjustable connection.

E. Wall Ties, (Mesh or Wire):
   1. Mesh wall ties formed of ASTM A82, W0.5, 2 mm, (16 gage) galvanized steel wire 13 mm by 13 mm (1/2 inch by 1/2 inch) mesh, 75 mm (3 inches) wide by 200 mm (8 inches) long.
   2. Rectangular wire wall ties formed of W1.4, 3 mm, (9 gage) galvanized steel wire 50 mm (2 inches) wide by 200 mm (8 inches) long.

F. Corrugated Wall Tie:
   1. Form from 1.5 mm (0.0598 inch) thick corrugated, galvanized steel 30 mm (1-1/4 inches) wide by lengths so as to extend at least 100 mm (4 inches) into joints of new masonry plus 38 mm (1-1/2 inch) turn-up.
   2. Provide 5 mm (3/16 inch) hole in turn-up for fastener attachment.

G. Adjustable Steel Column Anchor:
   1. Two piece anchor consisting of a 6 mm (1/4 inch) diameter steel rod to be welded to steel with offset ends, rod to permit 100 mm (4 inch) vertical adjustment of wire anchor.
   2. Triangular shaped wire anchor 100 mm (4 inches) wide formed from 5 (3/16 inch) diameter galvanized wire, to extend at least 75 mm (3 inches) into joints of masonry.

H. Adjustable Steel Beam Anchor:
   1. Z or C type steel strap, 30 mm (1 1/4 inches) wide, 3 mm (1/8 inch) thick.
   2. Flange hook not less than 38 mm (1 1/2 inches) long.
   3. Length to embed in masonry not less than 50 mm (2 inches) in 100 mm (4 inch) nominal thick masonry and 100 mm (4 inches) in thicker masonry.
   4. Bend masonry end not less than 40 mm (1 1/2 inches).

I. Ridge Wall Anchors:
   1. Form from galvanized steel not less than 25 mm (1 inch) wide by 5 mm (3/16 inch) thick by 600 mm (24 inches) long, plus 50 mm (2 inch) bends.
   2. Other lengths as shown.

2.5 PREFORMED COMPRESSIBLE JOINT FILLER

A. Thickness and depth to fill the joint as specified.

B. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.

C. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.

2.6 ACCESSORIES

A. Weep Hole Wicks: Glass fiber ropes, 10 mm (3/8 inch) minimum diameter, 300 mm (12 inches) long.

B. Box Board:
   1. Mineral Fiber Board: ASTM C612, Class 1.
   2. 25 mm (1 inch) thickness.
   3. Other spacing material having similar characteristics may be used subject to the Resident Engineer's approval.

C. Masonry Cleaner:
   1. Detergent type cleaner selected for each type masonry used.
   2. Acid cleaners are not acceptable.
   3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.

D. Fasteners:
   1. Concrete Nails: ASTM F1667, Type I, Style 11, 19 mm (3/4 inch) minimum length.

2. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
3. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

PART 3 – EXECUTION

3.1 JOB CONDITIONS

A. Protection:
1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.
2. On new work protect base of wall from mud, dirt, mortar droppings, and other materials that will stain face, until final landscaping or other site work is completed.

B. Cold Weather Protection:
1. Masonry may be laid in freezing weather when methods of protection are utilized.
2. Comply with MSJC and "Hot and Cold Weather Masonry Construction Manual".

C. Re-Use brick: Remove existing brick carefully to prevent damage. Scrape off any mortar from brick and clean as required. Store and protect brick until use. Only un-damaged brick can be re-used.

3.2 CONSTRUCTION TOLERANCES

A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements 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) - 10 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).

3.3 INSTALLATION GENERAL

A. Keep finish work free from mortar smears or spatters, and leave neat and clean.

B. Anchor masonry as specified in Paragraph, ANCHORAGE.

C. Wall Openings:

1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
2. If 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 a 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. Partition Height:

1. Extend partitions at least 100 mm (four inches) above suspended ceiling or to overhead construction where no ceiling occurs.
2. Extend following partitions to overhead construction.
   a. Where noted smoke partitions, FHP (full height partition), and FP (fire partition) and smoke partitions (SP) on drawings.
   b. Both walls at expansion joints.
   c. Corridor walls.
   d. Walls at stairway and stair halls, elevators, dumbwaiters, trash and laundry chute shafts, and other vertical shafts.
   e. Walls at refrigerator space.
   g. Reinforced masonry partitions
3. Extend finish masonry partitions at least four-inches above suspended ceiling and continue with concrete masonry units or structural clay tile to overhead construction:

F. Lintels:

1. Lintels are not required for openings less than 1000 mm (3 feet 4 inches) wide that have hollow metal frames.
2. Openings 1025 mm (3 feet 5 inches) wide to 1600 m (5 feet 4 inches) wide with no structural steel lintel or frames, require a lintel formed of concrete masonry lintel or bond beam units or structural facing tile lintel units filled with grout per ASTM C476 and

reinforced with 1- #15m (1-#5) rod top and bottom for each 100 mm (4 inches) of nominal thickness unless shown otherwise.

3. Precast lintels of 25 Mpa (3000 psi) concrete, of same thickness as partition, and with one Number 5 deformed bar top and bottom for each 100 mm (4 inches) of nominal thickness, may be used in lieu of reinforced CMU masonry lintels.
4. Use steel lintels, for openings over 1600 m (5 feet 4 inches) wide, brick masonry, and elevator openings unless shown otherwise.
5. Doors having overhead concealed door closers require a steel lintel, and a pocket for closer box.
6. Length for minimum bearing of 100 mm (4 inches) at ends.
7. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.

G. Wall, Furring, and Partition Units:

1. Lay out field units to provide for running bond of walls and partitions, with vertical joints in second course centering on first course units unless specified 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. Use no piece shorter than 100 mm (4 inches) long.
5. On interior partitions provide a 6 mm (1/4 inch) open joint for caulking between existing construction, exterior walls, concrete work, and abutting masonry partitions.
6. Use not less than 100 mm (4 inches) nominal thick masonry for free standing furring unless shown otherwise.
7. Do not abut existing plastered surfaces except suspended ceilings with new masonry partitions.

H. Use not less than 100 mm (4 inches) nominal thick masonry for fireproofing steel columns unless shown otherwise.

I. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

J. When new masonry partitions start on existing floors, machine cut existing floor finish material down to concrete surface.

K. Structural Steel Encased in Masonry:

1. Where structural steel is encased in masonry and the voids between the steel and masonry are filled with mortar, provide a minimum 25 mm (1 inch), unless otherwise noted, mortar free expansion space between

the masonry and the steel by applying a box board material to the steel before the masonry is laid.

2. Do not place spacing material where steel is bearing on masonry or masonry is bearing on steel.

L. Chases:

1. Do not install chases in masonry walls and partitions exposed to view in finished work, including painted or coated finishes on masonry.
2. Masonry 100 mm (4 inch) nominal thick may have electrical conduits 25 mm (1 inch) or less in diameter when covered with soaps, or other finishes.
3. Full recess chases after installation of conduit, with mortar and finish flush.
4. When pipes or conduits, or both occur in hollow masonry unit partitions retain at least one web of the hollow masonry units.

M. Wetting and Wetting Test:

1. Test and wet brick or clay tile in accordance with BIA 11B.
2. Do not wet concrete masonry units or glazed structural facing tile before laying.

N. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

O. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.

P. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.

Q. Allow not less than the following minimum time to elapse after completion of members before removing shores or forms, provided suitable curing conditions have been obtained during the curing period.

1. 10 days for girders and beams.
2. 7 days for slabs.
3. 7 days for reinforced masonry soffits.

3.4 ANCHORAGE

A. Veneer to Frame Walls:

1. Use adjustable veneer anchors.
2. Fasten anchor to stud through sheathing with self drilling and tapping screw, one at each end of loop type anchor.
3. Space anchors not more than 400 mm (16 inches) on center vertically at each stud.

B. Anchorage to Steel Beams or Columns:
   1. Use adjustable beam anchors on each flange.
   2. At columns weld the 6 mm (1/4 inch) steel rod to steel columns at 300 mm (12 inch) intervals, and place wire ties in masonry courses at 400 mm (16 inches) maximum vertically.

3.5 REINFORCEMENT

A. Joint Reinforcement:

   3. Brick veneer over frame backing walls does not require joint reinforcement.
   4. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.

B. Steel Reinforcing Bars:
   1. Install in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for lintels and bond beam horizontal reinforcement. Install in wall cavities of reinforced masonry walls where shown.
   2. Use grade 60 bars if not specified otherwise.
   3. Bond Beams:
      a. Form Bond beams of load-bearing concrete masonry units filled with ASTM C476 grout and reinforced with 2-#15m (#5) reinforcing steel unless shown otherwise. Do not cut reinforcement.
      b. Brake bond beams only at expansion joints and at control joints, if shown.
   4. Grout openings:
      a. Leave cleanout holes in double wythe walls during construction by omitting units at the base of one side of the wall.
      b. Locate 75 mm x 75 mm (3 in. x 3 in.) min. clean-out holes at location of vertical reinforcement.
      c. Keep grout space clean of mortar accumulation and sand debris. Clean the grout space every day using a high pressure jet stream of water, or compressed air, or industrial vacuum, or by laying wood strips on the metal ties as the wall is built. If wood strips are used, lift strips with wires as the wall progresses and before placing each succeeding course of wall ties.

3.6 BRICK EXPANSION AND CMU CONTROL JOINTS.

A. Provide brick expansion (BEJ) and CMU control (CJ) joints where shown on drawings.

B. Keep joint free of mortar and other debris.

C. Where joints occur in masonry walls.

1. Install preformed compressible joint filler in brick wythe.
2. Install cross shaped shear keys in concrete masonry unit wythe with preformed compressible joint filler on each side of shear key unless otherwise specified.
3. Install filler, backer rod, and sealant on exposed faces.

D. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.

E. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.7 BUILDING EXPANSION JOINTS

A. Keep joint free of mortar. Remove mortar and other debris.

B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.

C. Where joints are on exposed faces, provide depth for backer rod and sealant as specified in Section 07 92 00, JOINT SEALANTS, unless shown otherwise.

3.8 ISOLATION SEAL

A. Where full height walls or partitions lie parallel or perpendicular to and under structural beams or shelf angles, provide a separation between walls or partitions and bottom of beams or shelf angles not less than the masonry joint thickness unless shown otherwise.

B. Insert in the separation, a continuous full width strip of non-combustible type compressible joint filler.

C. Where exposed in finish work, cut back filler material in the joint enough to allow for the joint to be filled with sealant material specified in Section 07 92 00, JOINT SEALANTS.

3.9 BRICKWORK

A. Lay clay brick in accordance with BIA Technical Note 11 series.

B. Laying:

1. Lay brick in running bond with course of masonry bonded at corners unless shown otherwise. Match bond of existing building on alterations and additions.
2. Maintain bond pattern throughout.
3. Do not use brick smaller than half-brick at any angle, corner, break or jamb.
4. Where length of cut brick is greater than one half but less than a whole brick, maintain the vertical joint location of such units.
5. Lay exposed brickwork joints symmetrical about center lines of openings.

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 (eight inches) vertically, unless shown otherwise.
2. Rake joints for pointing with colored mortar when colored mortar is not full depth.

D. Weep Holes:
1. Install weep holes at 600 mm (24 inches) on center in bottom of vertical joints of exterior masonry veneer or cavity wall facing over foundations, bond beams, and other water stops in the wall.
2. Form weep holes using wicks made of mineral fiber insulation strips turned up 200 mm (8 inches) in cavity. Anchor top of strip to backup to securely hold in place.
3. Install sand or pea gravel in cavity approximately 75 mm (3 inches) high between weep holes.

E. Cavity Type Exterior Walls:
1. Keep air space clean of mortar accumulations and debris.
   a. Clean cavity by use of hard rubber, wood or metal channel strips having soft material on sides contacting wythes.
   b. Lift strips with wires before placing next courses of horizontal joint reinforcement or individual ties or adjustable cavity wall ties.
2. Veneer Framed Walls:
   a. Build with 100 mm (4 inches) of face brick over sheathed stud wall with air space.
   b. Keep air space clean of mortar accumulations and debris.

3.10 POINTING

A. Fill joints with pointing mortar using rubber float trowel to rub mortar solidly into raked joints.

B. Wipe off excess mortar from joints of glazed masonry units with dry cloth.

C. Finish exposed joints in finish work with a jointing tool to provide a smooth concave joint unless specified otherwise.

D. At joints with existing work match existing joint.

3.11 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 not more than 9000 mm (30 feet). Do not bond dam units into wythes as masonry headers.
4. Verify reinforcing bars are in cells of units or between wythes as shown.

B. Placing:
1. Place grout by hand bucket, concrete hopper, or grout pump.
2. Consolidate each lift of grout 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 inch) below top of last masonry course.
   b. Grout from dam to dam on high lift method.
   c. A longitudinal run of masonry may be stopped off only by raking back one-half a masonry unit length in each course and stopping grout 100 mm (4 inches) back of rake on low lift method.
   d. Place grout solid in masonry cavity below grade.

C. Puddling Method:
1. Consolidate by puddling with a grout stick during and immediately after placing.
2. Grout the cores of concrete masonry units containing the reinforcing bars solid as the masonry work progresses.

3.12 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 the Contract Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 25 mm (1 inch), whichever is greater.

C. For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1 1/2 times the nominal bar diameter or 38 mm (1-1/2 inches), whichever is greater. Provide lateral ties as indicated.

D. Splice reinforcement bars where shown; do not splice at other places unless accepted by the Resident Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
E. Provide not less than minimum lap as indicated on shop drawings, or if not indicated, as required by governing code.
F. Weld splices where indicated. Comply with the requirements of AWS D1.4 for welding materials and procedures.
G. Embed metal ties in mortar joints as work progresses, with a 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 the work progresses, with a 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 not less than 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
I. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.
J. Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

3.13 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. Do not wet concrete masonry units (CMU).
B. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 10 mm (3/8 inch) joints.
C. Where solid CMU units are shown, lay with full mortar head and bed joints.
D. Walls:
   1. Pattern Bond: Lay CMU wall units in 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.

2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
3. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

E. Columns, Piers and Pilasters:
1. Use CMU units of the size, shape and number of vertical core spaces shown. If not shown, use units which provide minimum clearances and grout coverage for number and size of vertical reinforcement bars shown.
2. Provide pattern bond shown, or if not shown, alternate head joints in vertical alignment.
3. Where bonded pilaster construction is shown, lay wall and pilaster units together to maximum pour height specified.

F. Grouting:
1. Use "Fine Grout" per ASTM C476 for filling spaces less than 100 mm (4 inches) in one or both horizontal directions.
2. Use "Coarse Grout" per ASTM C476 for filling 100 mm (4 inch) spaces or larger in both horizontal directions.
3. Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

G. Low-Lift Grouting:
1. Provide minimum clear dimension of 50 mm (2 inches) and clear area of 5160 mm^2 (8 square inches) in vertical cores to be grouted.
2. Place vertical reinforcement prior to grouting of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 3 m (10 feet).
3. Lay CMU to maximum pour height. Do not exceed 1.5 m (5 foot) height, or if bond beam occurs below 1.5 m (5 foot) height, stop pour 38 mm (1-1/2 in) below top of bond beam.
4. Pour grout using chute container with spout or pump hose. Rod or vibrate grout during placing. Place grout continuously; do not

interrupt pouring of grout for more than one hour. Terminate grout pours 38 mm (1-1/2 inches) below top course of pour.

5. Bond Beams: Stop grout in vertical cells 38 mm (1-1/2 inches) below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

3.14 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 a solution of soapless detergent. Do not use muriatic acid.
   2. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.
   3. Free clean surfaces of traces of detergent, foreign streaks, or stains of any nature.

C. Concrete Masonry Units:
   1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
   2. Allow mud to dry before brushing.

3.15 WATER PENETRATION TESTING

A. Seven days before plastering or painting, in the presence of Resident Engineer, test solid exterior masonry walls for water penetration.

B. Direct water on masonry for a period of one hour at a time when wind velocity is less than five miles per hour.

C. Should moisture appear on inside of walls tested, make additional tests at other areas as directed by Resident Engineer.

D. Correct the areas showing moisture on inside of walls, and repeat test at repaired areas, to insure that moisture penetration has been stopped.

E. Make water test at following locations: at least one place for each wall condition, such as new wall abutting existing, at wall intersections, at flashing.

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SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies structural steel shown and classified by Section 2, Code of Standard Practice for Steel Buildings and Bridges.

1.2 RELATED WORK

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

B. Painting: Section 09 91 00, PAINTING.

C. Steel Joist: Section 05 21 00, STEEL JOIST FRAMING.

D. Steel Decking: Section 05 31 00, STEEL DECKING.

E. Composite Steel Deck: Section 05 36 00, COMPOSITE METAL DECKING.

F. Fireproofing: Section 07 81 00, APPLIED FIREPROOFING.

1.3 QUALITY ASSURANCE

A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified Category Conventional Steel Structures fabrication plant.

B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the Resident Engineer.

1.4 TOLERANCES

Fabrication tolerances for structural steel shall be held within limits established by ASTM A6, by Section 7, Code of Standard Practice for Buildings and Bridges, and by Standard Mill Practice - General Information (AISC LRFD Manual, Second Edition, Page 1-183), except as follows:

A. Elevation tolerance for column splice points at time member is erected is 10 mm (3/8 inch).

B. Elevation tolerance for top surface of steel beams and girders at connections to columns at time floor is erected is 13 mm (1/2 inch).

C. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

1.5 DESIGN

A. Connections: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with the details shown on the Drawings, supplementing where necessary.

The details shown on the Drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection and the members. Promptly notify the Resident Engineer of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the Resident Engineer. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

1.6 REGULATORY REQUIREMENTS

A. AISC: Specification for Structural Steel Buildings - LRFD Specification for Structural Steel Buildings.

B. AISC: Code of Standard Practice for Steel Buildings and Bridges.

1.7 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop and Erection Drawings: Complete

C. Certificates:

1. Structural steel.
2. Steel for all connections.
3. Welding materials.
4. Shop coat primer paint.

D. Test Reports:

1. Welders' qualifying tests.

E. Design Calculations and Drawings:

1. Connection calculations, if required.

F. Record Surveys.

1.8 APPLICABLE PUBLICATIONS

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

B. American Institute of Steel Construction (AISC):

1. Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design (Ninth Edition, 1989)
2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Second Edition, 1995)
3. Code of Standard Practice for Steel Buildings and Bridges (March 2000).

C. American National Standards Institute (ANSI):

B18.22.1-98.....Plain Washers
B18.22M-00.....Metric Plain Washers

D. American Society for Testing and Materials (ASTM):
A6/A6M-02.....Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
A36/A36M-01.....Standard Specification for Carbon Structural Steel
A53/A53M-01.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A123/A123M-02.....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A242/A242M-01.....Standard Specification for High-Strength Low-Alloy Structural Steel
A283/A283M-00.....Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
A307-00.....Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A325-02.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A490-02.....Standard Specification for Heat-Treated Steel Structural Bolts 150 ksi Minimum Tensile Strength
A500-01.....Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A501-01.....Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
A572/A572M-01.....Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A992/A992M-02.....Standard Specification for Structural Steel Shapes

E. American Welding Society (AWS):
D1.1-02.....Structural Welding Code-Steel

F. Research Council on Structural Connections (RCSC) of The Engineering Foundation:
Specification for Structural Joints Using ASTM A325 or A490 Bolts

G. Military Specifications (Mil. Spec.):

MIL-P-21035.....Paint, High Zinc Dust Content, Galvanizing, Repair

H. Occupational Safety and Health Administration (OSHA):
29 CFR Part 1926-2001...Safety Standards for Steel Erection

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: ASTM A36, A572, Grade 50.
B. Structural Tubing: ASTM A500, Grade B.
C. Structural Tubing: ASTM A501.
D. Steel Pipe: ASTM A53, Grade B.
E. Bolts, Nuts and Washers:
1. High-strength bolts, including nuts and washers: ASTM A325 or A490.
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: ANSI Standard B18.22.1.
F. Zinc Coating: ASTM A123.
G. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035.

PART 3 - EXECUTION

3.1 CONNECTIONS (SHOP AND FIELD)

A. Welding: Welding in accordance with AWS D1.1. 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.
B. High-Strength Bolts: High-strength bolts tightened to a bolt tension not less than proof load given in Specification for Structural Joints Using ASTM A325 or A490 Bolts. 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 or the turn-of-the-nut method. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

3.2 FABRICATION

Fabrication in accordance with Chapter M, Specification for Steel Buildings - Load and Resistance Factor Design.

3.3 SHOP PAINTING

A. General: Shop paint steel with primer in accordance with Section 6, Code of Standard Practice for Steel Buildings and Bridges.
B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.
C. Do not apply paint to following:
1. Surfaces within 50 mm (2 inches) of joints to be welded in field.

2. Surfaces which will be encased in concrete.
3. Surfaces which will receive sprayed on fireproofing.
4. Top flange of members which will have shear connector studs applied.

D. Zinc Coated (Hot Dip Galvanized) per ASTM A123 (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.

3.4 ERECTION

A. General: Erection in accordance with Section 7, Code of Standard Practice for Steel Buildings and Bridges.

B. Temporary Supports: Temporary support of structural steel frames during erection in accordance with Section 7, Code of Standard Practice for Steel Buildings and Bridges.

3.5 FIELD PAINTING

A. After erection, touch-up steel surfaces specified to be shop painted. After welding is completed, clean and prime areas not painted due to field welding.

B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

3.6 SURVEY

Upon completion of finish bolting or welding on any part of the work, and prior to start of work by other trades that may be supported, attached, or applied to the structural steel work, submit a certified report of survey to Resident Engineer for approval. Reports shall be prepared by Registered Land Surveyor or Registered Civil Engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS. Report shall specify that location of structural steel is acceptable for plumbness, level and alignment within specified tolerances specified in the AISC Manual.

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SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies open web steel joists.

1.2 RELATED WORK

A. Structural Steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.

B. Finish Painting: Section 09 91 00, PAINTING.

1.3 DESIGN REQUIREMENTS

Design all elements with the latest published version of applicable Codes.

1.4 TOLERANCES

Deviation from a straight line between ends of any installed joist shall not exceed 10 mm in 3 m (3/8 inch in 10 feet).

1.5 REGULATORY REQUIREMENTS

STEEL JOIST INSTITUTE: Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, (Latest Edition).

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop and Erection Drawings: Complete.

1. Fabrication drawings including details and schedules for the fabrication and assembly of each joist.
2. Erection drawings showing the size and location of each joist, bridging, cross bracing, bearing details, connections, welds, bolts and bearing plates.

C. Certificates: STEEL JOIST INSTITUTE compliance.

D. Design Calculations: If requested by the Resident Engineer, submit complete calculations covering the design of all members and connections. Calculations must be specifically applicable to the joists supplied.

1.7 QUALITY ASSURANCE

Provide documentation that the joist manufacturer is a member of the Steel Joist Institute and has satisfactorily completed work of a similar scope and nature.

1.8 APPLICABLE PUBLICATIONS

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

B. American Institute of Steel Construction (AISC):

1. Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design (Latest Edition).
2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition).

C. American Society for Testing and Materials (ASTM):
A307-07.....Carbon Steel Bolts and Studs, 400 MPa (60,000 psi) Tensile Strength
A325-09.....Structural Bolts, Steel, Heat Treated, 800/700 MPa (120/105 ksi) Minimum Tensile Strength
A490-08.....Heat-Treated Steel Structural Bolts, 1000 MPA (150 ksi) Minimum Tensile Strengths

D. American Welding Society (AWS):
D1.1-08.....Structural Welding Code – Steel

E. SSPC: The Society for Protective Coatings:
Steel Structures Painting Manual, Volumes 1 and 2

F. Steel Joist Institute (STEEL JOIST INSTITUTE):
Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders (Latest Edition).

G. U.S. Army Corps of Engineers:
CRD-C-621.....Specification for Non-Shrink Grout

PART 2 - PRODUCTS

2.1 OPEN WEB STEEL JOISTS

K-Series conforming to STEEL JOIST INSTITUTE standard specifications.

2.2 ACCESSORIES – FITTINGS

A. Accessories and fittings, including end supports and bridging, in accordance with standard STEEL JOIST INSTITUTE specification under which joists were designed.

B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.

C. High-strength bolts, including nuts and washers: ASTM A325 or A490 heavy hexagon structural bolts.

PART 3 - EXECUTION

3.1 FABRICATION

A. Fabrication and assembly in accordance with applicable standard STEEL JOIST INSTITUTE specification:

1. Make chord splices with full penetration welds capable of developing the ultimate strength in tension of the parent material. Make no

allowance for the strength of back-up bars or other material incidental to welding.

2. Provide shop-welded connection plates at panel points to receive supplemental framing.
3. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.
4. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable STEEL JOIST INSTITUTE specifications.
5. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with STEEL JOIST INSTITUTE specifications. Provide bridging anchors for ends of bridging lines terminating at walls or beams. Provide bridging adequate to resist the loads indicated on the Contract Documents.
6. End Anchorage: Provide end anchorages, including bearing plates, to secure joists to adjacent construction, complying with STEEL JOIST INSTITUTE specifications, unless otherwise indicated. Design all end anchorages to resist a minimum net uplift of 1.6 kPa (35 pounds per square foot) of supported area.
7. Provide supplemental steel support framing for metal deck where normal deck bearing is precluded by other framing members and minor openings.

3.2 SHOP PAINTING

A. Shop painting in accordance with applicable STEEL JOIST INSTITUTE standard specification.

B. Shop paint joists and accessories with a rust-inhibiting primer paint. For joists which will be finish painted, limit paint to a primer which is compatible with specified finish paint. In high humidity areas, shop paint joists with a zinc-rich primer to receive top coats per the paint system manufacturer's recommendations.

3.3 ERECTION

A. Installation of joists in accordance with applicable STEEL JOIST INSTITUTE standard specification.

B. Handle joists in a manner to avoid damaging of joists. Remove damaged joists from site, except when field repair is approved and such repairs are satisfactorily made in accordance with manufacturer's recommendations.

C. Accurately set joists and end anchorage in accordance with the applicable STEEL JOIST INSTITUTE standard specification. Secure bridging

and anchoring in place prior to application of any construction loads. Distribute any temporary loads so that carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging where joist lengths are 12 m (40 feet) and longer. Where joist lengths are 12 m (40 feet) and longer, install a center row of bolted diagonal bridging to provide lateral stability before slackening of hoisting lines.

3.4 FIELD PAINTING

A. Clean abraded, corroded, and field welded areas and touch up with same type of paint used in shop painting.

B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

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SECTION 05 31 00
STEEL DECKING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies material and services required for installation of steel decking as shown and specified.

1.2 RELATED WORK

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

B. Finish Painting: Section 09 91 00, PAINTING.

1.3 DESIGN REQUIREMENTS

A. Design steel decking in accordance with AISI publication, "Specification for the Design of Cold-formed Steel Structural Members" except as otherwise shown or specified.

B. Design all elements with the latest published version of applicable codes.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and similar information necessary for completing installation as shown and specified, including supplementary framing, sump pans, ridge and valley plates, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.

C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics.

D. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a "Steel Floor and Form Unit".

E. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

1.5 QUALITY ASSURANCE

A. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

B. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Global and are listed in "Factory Mutual Research Approval Guide" for "Class 1" fire rated construction.

1.6 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 Society for Testing and Materials (ASTM):

A36/A36M-08.....Standard Specification for Carbon Structural Steel

A611-97.....Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled

A653/A653M-08.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

C423-08.....Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C. American Institute of Steel Construction (AISC):

1. Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design (ninth Edition, 1989)
2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)

D. American Iron and Steel Institute (AISI):

1. Specification and Commentary for the Design of Cold-Formed Steel Structural Members

E. American Welding Society (AWS):

D1.3-08.....Structural Welding Code - Sheet Steel

F. Factory Mutual (FM Global):

1. Loss Prevention Data Sheet 1-28: Wind Loads to Roof Systems and Roof Deck Securement
2. Factory Mutual Research Approval Guide (2002)

G. Military Specifications (Mil. Spec.)

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Decking: ASTM A653, Structural Quality.

B. Galvanizing: ASTM A653, G60.

C. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.

D. 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.

E. Miscellaneous Steel Shapes: ASTM A36.

F. Welding Electrode: E60XX minimum.

G. Sheet Metal Accessories: ASTM A653, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:

1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel shall be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures shall be limited to 3 mm (1/8 inch) maximum.
3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
4. Seat Angles for Deck: Provide where a beam does not frame into a column.
5. Sump Pans for Roof Drains: Fabricated from single piece of minimum 1.9 mm (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 75 mm (3 inches) wide. Recess pans not less than 38 mm (1 1/2 inches) below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

2.2 REQUIREMENTS

A. Provide steel decking of the type, depth, gauge, and section properties as shown.

B. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces utilized to act as a permanent support for all superimposed loads. Comply with the depth and minimum gage requirements as shown on the Contract Documents.

1. Wide Rib (Type B) deck.
2. Finish: Galvanized G-60.

C. Do not use steel deck for hanging supports for any type or kind of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.

PART 3 - EXECUTION

3.1 ERECTION

A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.

B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

C. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace any deck units that become damaged after erection and prior to casting concrete at no cost to the Government.

D. Provide steel decking in sufficient lengths to extend over 3 or more spans.

E. Place steel decking units at right angles to supporting members. End laps of sheets of roof deck shall be a minimum of 50 mm (2 inches) and shall occur over supports.

F. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.
2. Tack weld or use self-tapping No. 8 or larger machine screws at 915 mm (3 feet) o.c. for fastening end closures. Only use welds to attach longitudinal end closures.

3. Weld side laps of adjacent floor deck units that span more than 1524 mm (5 feet). Fasten at midspan or 915 mm (3 feet) o.c., whichever is smaller.
4. Fasten roof deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. at every support, and at closer spacing where required for lateral force resistance by diaphragm action. Attach split or partial panels to the structure in every valley. In addition, secure deck to each supporting member in ribs where side laps occur. Power driven fasteners may be used in lieu of welding for roof deck if strength equivalent to the welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
5. Mechanically fasten side laps of adjacent roof deck units with spans greater than 1524 mm (5 feet) between supports, at intervals not exceeding 915 mm (3 feet) o.c., or midspan, whichever is closer, using self-tapping No. 8 or larger machine screws.
6. Provide any additional fastening necessary to comply with the requirements of Underwriters Laboratories and/or Factory Mutual to achieve the required ratings.
7. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 2.1 kPa (45 psf) at eave overhang and 1.4 kPa (30 psf) for other roof areas.

G. Cutting and Fitting:
1. Cut all metal deck units to proper length in the shop prior to shipping.
2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the Structural Drawings.
3. Other penetrations shown on the approved metal deck shop drawings but not shown on the Structural Drawings are to be located, cut and reinforced by the trade requiring the opening.
4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the Resident Engineer. Provide any

additional reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.

6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

3.2 WELDING

Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.3.

3.3 FIELD REPAIR

1. Areas scarred during erection.
2. Welds to be thoroughly cleaned and touched-up. Touch-up paint for zinc-coated units shall be zinc rich galvanizing repair paint.

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SECTION 05 36 00
COMPOSITE METAL DECKING

PART 1 – GENERAL

1.1 DESCRIPTION

This section specifies material and services required for installation of composite steel decking including shear connector studs and miscellaneous closures required to prepare deck for concrete placement as shown and specified.

1.2 RELATED WORK

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

1.3 DESIGN REQUIREMENTS

A. Design steel decking in accordance with American Iron And Steel Institute publication "Specifications for the Design of Cold Formed Steel Structural Members", except as otherwise shown or specified.
B. Design all elements with the latest published version of applicable codes.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and information necessary to complete the installation as shown and specified, including supplementary framing, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.
C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics as specified herein.
D. Manufacturer's written recommendations for:
   1. Shape of decking section to be used.
   2. Cleaning of steel decking prior to concrete placement.
E. Test Report - Establishing structural characteristics of composite concrete and steel decking system.
F. Test Report - Stud base qualification.

G. Welding power setting recommendation by shear stud manufacturer.

H. Shear Stud Layouts: Submit drawings showing the number, pattern, spacing and configuration of the shear studs for each beam and girder.

I. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a "Steel Floor and Form Unit".

1.5 QUALITY ASSURANCE

Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Refer to the latest edition of all referenced Standards and codes.

B. American Iron and Steel Institute (AISI):
Specification and Commentary for the Design of Cold-Formed Steel Structural Members (Latest Edition).

C. American Society of Testing and Materials (ASTM):
A36/A36M.....Standard Specification for Carbon Structural Steel
A108.....Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality
A653/A653M.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

D. American Institute of Steel Construction (AISC):
1. Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design (Latest Edition)
2. Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)

E. American Welding Society (AWS):
D1.1.....Structural Welding Code - Steel
D1.3.....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. Steel Decking and all Flashings: ASTM A653, Structural Quality suitable for shear stud weld-through techniques.

B. Galvanizing: ASTM A653, G60.

C. Shear connector studs: ASTM A108, Grades 1015-1020, yield 350 Mpa (50,000 psi) minimum, tensile strength - 400 Mpa (60,000 psi) minimum, reduction of area 50 percent minimum. Studs of uniform diameter; heads shall be concentric and normal to shaft; stud, after welding free from any substance or defect which would interfere with its function as a shear connector. Studs shall not be painted or galvanized. Size of studs shall be as shown on drawings. Studs manufactured by a company normally engaged in the manufacturer of shear studs and can furnish equipment suitable for weld-through installation of shear studs.

D. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.

E. Miscellaneous Steel Shapes: ASTM A36.

F. Welding Electrode: E60XX minimum.

G. Sheet Metal Accessories: ASTM A653, galvanized, unless noted otherwise. Provide accessories of every kind required to complete the installation of metal decking in the system shown. Finish sheet metal items to match deck including, but not limited to, the following items:

1. Metal Cover Plates: For end-abutting deck units, to close gaps at changes in deck direction, columns, walls and openings. Same quality as deck units but not less than 1.3 mm (18 gauge) sheet steel.
2. Continuous sheet metal edging: at openings and concrete slab edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel shall be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures shall be limited to 3 mm (1/8 inch) maximum.
3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
4. Seat angles for deck: Where a beam does not frame into a column.

2.2 REQUIREMENTS

A. Steel decking depth, gage, and section properties to be as shown. Provide edges of deck with vertical interlocking male and female lip providing for a positive mechanical connection.

B. Fabricate deck units with integral embossments to provide mechanical bond with concrete slab. In combination with concrete slab, capable of supporting total design loads on spans shown.

C. Steel decking capable of safely supporting total, normal construction service loads without damage to decking unit.

D. Steel decking units shall include an integral system which provides a simple point of attachment for light duty hanger devices for flexibility for attaching hangers for support of acoustical, plumbing, heating, air conditioning and electrical items. System shall provide for minimum spacing pattern of 300 mm (12 inches) on centers longitudinally and 600 mm or 900 mm (24 or 36 inches) on centers transversely. Suspension system shall be capable of safely supporting a maximum allowable load of 45 kg (100 pounds) concentrated at any one hanger attachment point. System may consist of fold-down type hanger tabs or a lip hanger.

PART 3 - EXECUTION

3.1 ERECTION

A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.

B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

C. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace any deck units that become damaged after erection and prior to casting concrete at no cost to the Government.

D. Erect steel deck in accordance with manufacturer's printed instructions.

E. Ship steel deck units to project in standard widths and cut to proper length.

F. Provide steel decking in sufficient lengths to extend over 3 or more spans, except where structural steel layout does not permit.

G. Place steel decking units on supporting steel framework and adjust to final position before being permanently fastening. Bring each unit to proper bearing on supporting beams. Place deck units in straight

alignment for entire length of run of flutes and with close registration of flutes of one unit with those of abutting unit. Maximum space between ends of abutting units is 13 mm (1/2 inch). If space exceeds 13 mm (1/2 inch), install closure plates at no additional cost to Government.

H. Ceiling hanger loops, if used, must be flattened or removed to obtain bearing of units on structural steel.

I. Fastening Deck Units:
   1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.
   2. Tack weld or use self-tapping No. 8 or larger machine screws at 915 mm (3 feet) o.c. for fastening end closures. Only use welds to attach longitudinal end closures.
   3. Weld side laps of adjacent floor deck units that span more than 1524 mm (5 feet). Fasten at midspan or 915 mm (3 feet) o.c., whichever is smaller.

J. Welding to conform to AWS D1.3 and done by competent experienced welding mechanics.

K. Areas scarred during erection and welds shall be thoroughly cleaned and touched-up with zinc rich galvanizing repair paint. Paint touch-up is not required for welds or scars that are to be in direct contact with concrete.

L. Provide metal concrete stops at edges of deck as required.

M. Cutting and Fitting:
   1. Cut all metal deck units to proper length in the shop prior to shipping.
   2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the structural drawings.
   3. Other penetrations shown on the approved metal deck shop drawings but not shown on the structural drawings are to be located, cut and reinforced by the trade requiring the opening.
   4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
   5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports

in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the Resident Engineer. Provide any additional reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.

6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

N. Installation of shear connector studs through previously installed metal deck to conform to AWS D1.1, Section 7, except all studs will be installed with automatically timed welding equipment and as specified below:

1. Do not place reinforcing steel temperature mesh or other materials and equipment which will interfere with stud installation on steel deck until shear connector studs are installed.
2. Steel deck sheets shall be free of oil, rust, dirt, and paint. Release water in deck's valley so that it does not become entrapped between deck and beam. Surface to which stud is to be welded shall be clean and dry.
3. Rest metal deck tightly upon top flange of structural member with bottom of deck rib in full contact with top of beam flange.
4. Weld studs only through a single thickness of deck. Place decking so that a butt joint is obtained. Place studs directly over beam web, where one row of studs are required.
5. Ferrules specially developed for the weld-through technique must be used. Ferrules shall be appropriate for size of studs used and be removed after welding.
6. Submit report of successful test program for stud base qualification as required by AWS D1.1, Appendix K.

3.2 CLEANING

Clean deck in accordance with manufacturer's recommendation before concrete placement.

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall and Ceiling Mounted Items: (12, 14A, 14C)
2. Frames: (24E)
3. Loose Lintels
4. Shelf Angles
5. Gas Racks
6. Plate Door Sill
7. Ladders
8. Railings: (10)

C. Some conditions may not apply. Refer to drawings for the required work.

1.2 RELATED WORK

A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.

B. Prime and finish painting: Section 09 91 00, PAINTING.

C. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

C. Manufacturer's Certificates:

1. Finish as specified.
2. Live load designs as specified.

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

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

1.4 QUALITY ASSURANCE

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

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

C. 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):

B18.6.1-81(2008).....Wood Screws

B18.2.2-87(2005).....Square and Hex Nuts

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

A36/A36M-08.....Structural Steel

A47-99 (2004).....Malleable Iron Castings

A48-03 (2008).....Gray Iron Castings

A53-07.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-08.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A167-99(2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A269-08.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-07b.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A312/A312M-08a.....Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A391/A391M-07.....Grade 80 Alloy Steel Chain

A653/A653M-08.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A786/A786M-05.....Rolled Steel Floor Plate

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B456-03.....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
B632-08.....Aluminum-Alloy Rolled Tread Plate
C1107-08.....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
F436-07a.....Hardened Steel Washers
F468-06e1.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
F593-02 (2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs
F1667-05.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):
D1.1-08.....Structural Welding Code Steel
D1.2-03.....Structural Welding Code Aluminum
D1.3-08.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)
AMP521-01.....Pipe Railing Manual
AMP 500-06.....Metal Finishes Manual
MBG 531-00.....Metal Bar Grating Manual
MBG 532-00.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC):
SP 1-05.....No. 1, Solvent Cleaning
SP 2-05.....No. 2, Hand Tool Cleaning
SP 3-05.....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):
RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.
B. Ladders and Rungs: 120 kg (250 pounds) at any point.
C. Railings and Handrails: 900 N (250 pounds) in any direction at any point.
D. Manhole Covers: 1200 kg/m^2 (250 pounds per square foot).

2.2 MATERIALS

A. Structural Steel: ASTM A36.
B. Stainless Steel: ASTM A167, 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. Steel Pipe: ASTM A53.

1. Galvanized for exterior locations.
2. Type S, Grade A unless specified otherwise.
3. NPS (inside diameter) as shown.

E. Cast-Iron: ASTM A48, Class 30, commercial pattern.

F. Malleable Iron Castings: A47.

G. Primer Paint: As specified in Section 09 91 00, PAINTING.

H. Stainless Steel Tubing: ASTM A269, type 302 or 304.

I. 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 with in 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.

J. 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 Metal Finishes Manual.
2. Aluminum: NAAMM AMP 501.
   a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
   b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
   c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
   d. Painted: AA-C22R10.
3. Steel and Iron: NAAMM AMP 504.
   a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
   b. Surfaces exposed in the finished work:

1) Finish smooth rough surfaces and remove projections.
2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.

c. Shop Prime Painting:
1) Surfaces of Ferrous metal:
a) Items not specified to have other coatings.
b) Galvanized surfaces specified to have prime paint.
c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
2) Non ferrous metals: Comply with MAAMM-500 series.

4. Stainless Steel: NAAMM AMP-504 Finish No. 4.
5. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

G. Protection:
1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:
1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Wall Mounted Items:
1. For items supported by metal stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.

5. 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 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.

D. Supports at Ceiling for Radiographic (x-ray) Equipment:
1. Fabricate hangers braces, and track of modular channel units assembly as shown.
2. Fabricate steel plates for anchor to structure above.
3. Drill bent plates for bolting at mid height at concrete beams.

E. For Operating Room Light:
1. Fabricate as shown to suit equipment furnished.
2. Drill leveling plate for light fixture bolts.

2.6 FRAMES

A. Channel Door Frames:
1. Fabricate of structural steel channels of size shown.
2. Miter and weld frames at corners.
3. Where anchored to masonry or embedded in concrete, weld to back of frame at each jamb, 5 mm (3/16 inch) thick by 44 mm (1-3/4 inch) wide steel strap anchors with ends turned 50 mm (2 inches), and of sufficient length to extend at least 300 mm (12 inches) into wall. Space anchors 600 mm (24 inches) above bottom of frame and 600 mm (24 inches) o.c. to top of jamb. Weld clip angles to bottom of jambs and provide holes for expansion bolts.
4. Where anchored to concrete or masonry in prepared openings, drill holes at jambs for anchoring with expansion bolts. Weld clip angles to bottom of frame and provide holes for expansion bolt anchors as shown. Drill holes starting 600 mm (24 inches) above bottom of frame and 600 mm (24 inches) o.c. to top of jamb and at top of jamb. Provide pipe spacers at holes welded to channel.
5. Where closure plates are shown, continuously weld them to the channel flanges.
6. Weld continuous 19 x 19 x 3 mm (3/4 x 3/4 x 1/8 inch) thick steel angles to the interior side of each channel leg at the head and jambs to form a caulking groove.

7. Prepare frame for installation of hardware specified in Section 08 71 00, DOOR HARDWARE.
   a. Cut a slot in the lock jamb to receive the lock bolt.
   b. Where shown use continuous solid steel bar stops at perimeter of frame, weld or secure with countersunk machine screws at not more than 450 mm (18 inches) on center.

B. Frames for Breech Opening:
1. Fabricate from steel channels, or combination of steel plates and angles to size and contour shown.
2. Weld strap anchors on back of frame at not over 600 mm (2 feet) on centers for concrete or masonry openings.

D. Frames for Lead Lined Doors:
1. Obtain accurate dimensions and templates from suppliers of lead lined doors, finish hardware, and hollow steel door frames.
2. Fabricate as shown for use in connection with lead lined doors.
3. Deliver assembled frames with removable shipping spreaders at top and bottom.
4. Extend angles at jambs from floor to structural slab above. At floors of interstitial spaces, terminate jamb sections and provide anchors as shown.
5. Continuously weld plates and reinforcements to frame members and head members of angle frames between jambs.
6. Weld strap anchors, not over 600 mm (24 inches) on centers, to the back of angles for embedment in masonry or concrete unless shown otherwise.
7. Type 15 Door Frames:
   a. Structural steel angle frames with plate or bar full height to heads. Extend reinforcing at hinge cutouts two inches beyond cutout.
   b. Fabricate top anchorage to beam side at mid height.
   c. Weld clip angles to both legs of angle at top and bottom.
   d. Drill clips and plates, at top and bottom for anchoring jamb angles with two 9 mm (3/8 inch) expansion bolts at each location.
   e. Cut rabbet for pivot hinges and lock strike.

2.7 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.

2.8 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.

2.10 PLATE DOOR SILL

A. Fabricate of checkered plate as detailed.
   1. Aluminum Plate: ASTM B632, 3 mm (0.125 inch) thick.
B. Fabricate for anchorage with flat head countersunk bolts at each end and not over 300 mm (12 inches), o.c.
C. Where doors on a curb open onto a roof area over base flashing provide a plate door sill to protect base flashing and counter flashing

2.11 LADDERS

Use ladders only where allowed by OSHA. Refer to drawings for location and type.

A. Aluminum Ladders:
   1. Fixed-rail type, constructed of structural aluminum, with mill finish.
   2. Fabricate side rails and rungs of size and design shown, with the rungs shouldered and headed into and welded to the rails.
   3. Where shown fabrication side rails curved, twisted and formed into gooseneck.

4. Fabricate angle brackets at top and bottom and intermediate brackets where shown. Drill for bolting.

2.12 RAILINGS

A. In addition to the dead load design railing assembly to support live load specified.

B. Fabrication General:
   1. Provide continuous welded joints, dressed smooth and flush.
   2. Standard flush fittings, designed to be welded, may be used.
   3. Exposed threads will not be approved.
   4. Form handrail brackets to size and design shown.
   5. Exterior Post Anchors.
      a. Fabricate tube or pipe sleeves with closed ends or plates as shown.
      b. Where inserts interfere with reinforcing bars, provide flanged fittings welded or threaded to posts for securing to concrete with expansion bolts.
      c. Provide heavy pattern sliding flange base plate with set screws at base of pipe or tube posts. Base plates are not required on pipe sleeves where ornamental railings occur.
   6. Interior Post Anchors:
      a. Provide flanged fittings for securing fixed posts to floor with expansion bolts, unless shown otherwise.
      b. Weld or thread flanged fitting to posts at base.
      c. For securing removable posts to floor, provide close fitting sleeve insert or inverted flange base plate with stud bolts or rivets concrete anchor welded to the base plate.
      d. Provide sliding flange base plate on posts secured with set screws.
      e. Weld flange base plate to removable posts set in sleeves.

C. Handrails:
   1. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
   2. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.

D. Steel Pipe Railings:
   1. Fabricate of steel pipe with welded joints.
   2. Number and space of rails as shown.
   3. Space posts for railings not over 1800 mm (6 feet) on centers between end posts.
   4. Form handrail brackets from malleable iron.

5. Fabricate removable sections with posts at end of section.
6. Removable Rails:
   a. Provide "U" shape brackets at each end to hold removable rail as shown. Use for top and bottom horizontal rail when rails are joined together with vertical members.
   b. Secure rail to brackets with 9 mm (3/8 inch) stainless steel through bolts and nuts at top rail only when rails joined with vertical members.
   c. Continuously weld brackets to post.
   d. Provide slotted bolt holes in rail bracket.
   e. Weld bolt heads flush with top of rail.
   f. Weld flanged fitting to post where posts are installed in sleeves.
7. 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.

E. Aluminum Railings:
1. Fabricate from extruded aluminum.
2. Use tubular posts not less than 3 mm (0.125 inch) wall thickness for exterior railings.
3. Punch intermediate rails and bottom of top rails for passage of posts and machine to a close fit.
4. Where shown use extruded channel sections for top rail with 13 mm (1/2 inch) thick top cover plates and closed ends.
5. Fabricate brackets of extruded or wrought aluminum as shown.
6. Fabricate stainless pipe sleeves with closed bottom at least six inches deep having internal dimensions at least 13 mm (1/2 inch) greater than external dimensions of posts where set in concrete.

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. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

G. 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. Support at Ceiling for X-ray Tube Stand and Radiographic Equipment:
   1. Bolt modular steel channel frames to hangers as shown, anchored to structure above.
   2. Fasten frames with modular channel manufacturers fittings, bolts, and nuts. Space modular channel supports and hangers as shown and as required to suit equipment furnished.
   3. Install closure plates in channels at ceiling where channel opening is visible. Coordinate and cut plates to fit tight against equipment anchors after equipment anchors are installed.

D. Ceiling Support for Operating Light:

1. Anchor support to structure above as shown.
2. Set leveling plate as shown level with ceiling.
3. Secure operating light to leveling plate in accordance with light manufacturer's requirements.

E. 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.

F. 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.

3.4 FRAMES FOR LEAD LINED DOORS

A. Secure jamb angle clips and plates, at top and bottom with two, 9 mm (3/8 inch) expansion bolts to concrete.
B. Secure 150 x 90 x 13 mm (6 x 3-1/2 x 1/2 inch) angle to steel framing for anchorage when expansion bolts to concrete is not possible.
C. Secure clips by welding to steel.
D. At interstitial spaces, anchor jamb angles as shown.

3.5 DOOR FRAMES

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

3.6 OTHER FRAMES

A. Set frame flush with surface unless shown otherwise.
B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
C. Set in formwork before concrete is placed.

3.7 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.

3.8 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.

3.9 PLATE DOOR SILL

A. Install after roofing base flashing and counter flashing work is completed.

B. Set in sealant and bolt to curb.

3.10 LADDERS

A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.

B. Ladder Rungs:

1. Set ladder rungs into formwork before concrete is placed, or Build ladder rungs into masonry as the work progresses.
2. Set step portion of rung 150 mm (6 inches) from wall.
3. Space rungs approximately 300 mm (12 inches) on centers.
4. Where only one rung is required, locate it 400 mm (16 inches) above the floor.

3.12 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.

B. Aluminum Railing, and Ornamental Railing Posts:
   1. Install pipe sleeves in concrete formwork.
   2. Set posts in sleeve and pour grout to surface on exterior locations and to within 6 mm (1/4 inch) of surface for interior locations except to where posts are required to be removable.
   3. Apply beveled bead of urethane sealant over sleeve at post perimeter for exterior posts and flush with surface for interior posts as specified in Section 07 92 00, JOINT SEALANTS.
C. Anchor to Walls:
   1. Anchor rails to concrete or solid masonry with machine screws through flanged fitting to steel plate.
      a. Anchor steel plate to concrete or solid masonry with expansion bolts.
      b. Anchor steel plate to hollow masonry with toggle bolts.
   2. Anchor flanged fitting with toggle bolt to steel support in frame walls.
D. 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.

3.13 STEEL COMPONENTS FOR MILLWORK ITEMS

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

3.14 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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SECTION 05 51 00
METAL STAIRS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies steel stairs with railings.

B. Types:

1. Closed riser stairs with concrete filled treads and platforms.

1.2 RALATED WORK

A. Concrete fill for treads and platforms: Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Wall handrails and railings for other than steel stairs: Section 05 50 00, METAL FABRICATIONS.

C. Requirements for shop 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. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.

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 basic designation.

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

A36/A36M-08.....Structural Steel

A47-99 (2004).....Ferritic Malleable Iron Castings

A48-03 (2008).....Gray Iron Castings

A53-07.....Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless

A307-07b.....Carbon Steel Bolts and Studs, 60000 psi Tensile Strength

A653/653M-08.....Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated (Galvannealed) by the Hot-Dip Process

A563-07a.....Carbon and Alloy Steel Nuts

A1008/A1008M-08a.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy

A786/A786M-05.....Rolled Steel Floor Plates

A1011-08.....Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural, High-Strength, Low-Alloy

C. American Welding Society (AWS):

D1.1-08.....Structural Welding Code-Steel
D1.3-08.....Structural Welding Code-Sheet Steel

D. The National Association of Architectural Metal Manufactures (NAAMM) Manuals:
Metal Bar Gratings (ANSI/NAAMM MBG 531-00)
AMP521-01.....Pipe Railing Manual, Including Round Tube

E. American Iron and Steel Institute (AISI):
D110-07.....Design of Cold-Formed Steel Structural Members

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. Design stairs to support a live load of 500 kg/m^2 (100 pounds per square foot).

B. Structural design, fabrication and assembly in accordance with requirements of NAAMM Metal Stairs Manual, except as otherwise specified or shown.

C. Design pipe railings in accordance with NAAMM Pipe Railing Manual for 900 N (250 pounds) in any direction at any point.

2.2 MATERIALS

A. Steel Pipe: ASTM A53, Standard Weight, zinc coated.

B. Sheet Steel: ASTM A1008.

C. Structural Steel: ASTM A36.

D. Steel Floor Plate: ASTM 786.

E. Steel Decking: Form from zinc coated steel conforming to ASTM A446, with properties conforming to AISI Specification for the Design of Cold-Formed Steel Structural Members.

F. Steel Plate: ASTM A1011.

G. Iron Castings: ASTM A48, Class 30.

H. Malleable Iron Castings: ASTM A47.

2.3 FABRICATION GENERAL

A. Fasteners:
1. Conceal bolts and screws wherever possible.
2. Use countersunk heads on exposed bolts and screws with ends of bolts and screws dressed flush after nuts are set.

B. Welding:
1. Structural steel, AWS D1.1 and sheet steel, AWS D1.3.
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: Prepare surface and apply primer as specified for ferrous metals in Section 09 91 00, PAINTING.

2.4 RAILINGS

A. Fabricate railings, including handrails, from steel pipe with flush.
   1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
   2. Wall handrails are provided under Section 05 50 00, METAL FABRICATIONS.
B. Return ends of handrail to wall and close free end.
C. Provide standard terminal castings where fastened to newel.
D. Space intermediate posts not over six 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.

2.5 CLOSED RISER STAIRS

A. Provide treads, risers, platforms, railings, stringers, headers and other supporting members.
B. Fabricate pans for treads and platforms, and risers from sheet.
C. Form risers with sanitary cove.
D. Fabricate stringers, headers, and other supporting members from structural steel.

PART 3 - EXECUTION

3.1 STAIR INSTALLATION

A. Provide hangers and struts required to support the loads imposed.
B. Perform job site welding and bolting as specified for shop fabrication.
C. Set stairs and other members in position and secure to structure as shown.
D. Install stairs plumb, level and true to line.
E. Provide steel closure plate to fill any gap between the stringer and surrounding shaft wall. Weld and finish with prime and paint finish of adjoining steel.

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 3650 mm (1/8-inch in 12 feet).

D. Set posts plumb and aligned to within 3 mm in 3650 mm (1/8-inch in 12 feet).

3.3 FIELD PRIME PAINTING

A. When installation is complete, clean field welds and surrounding areas to bright metal, and coat with same primer paint used for shop priming.

B. Touch-up abraded areas with same primer paint used for shop priming.

C. Touch up abraded galvanized areas with zinc rich paint as specified in section 09 91 00, PAINTING.

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Section specifies wood blocking, framing, sheathing, furring, nailers, as shown on drawings. Coordinate this section with shielding requirements specified in other parts of the construction documents.

1.2 RELATED WORK:

A. Plastic Laminate Healthcare Casework: Section 12 35 700, PLASTIC LAMINATE HEALTHCARE CASEWORK

B. Countertops: Section 12 36 00, COUNTERTOPS

D. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

E. Section 13 49 00: RADIATION PROTECTION

1.3 SUMBITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

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 150 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 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):
National Design Specification for Wood Construction
NDS-05.....Conventional Wood Frame Construction

C. American Institute of Timber Construction (AITC):
A190.1-2007.....Structural Glued Laminated Timber

D. American Society of Mechanical Engineers (ASME):
B18.2.1A-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87(R2005).....Square and Hex Nuts

B18.6.1-81 (R2008).....Wood Screws
B18.6.4-1999(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

E. American Plywood Association (APA):
E30U-2007.....Engineered Wood Construction Guide

F. American Society for Testing And Materials (ASTM):
A47-99(2004).....Ferritic Malleable Iron Castings
A48-03 (2008).....Gray Iron Castings
A653/A653M-08.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
C954-07.....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
C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
D143-94 (2007).....Small Clear Specimens of Timber, Method of Testing
D1760-01.....Pressure Treatment of Timber Products
D2559-04.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
D3498-03.....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
F844-07a.....Washers, Steel, Plan (Flat) Unhardened for General Use
F1667-05.....Nails, Spikes, and Staples

G. Federal Specifications (Fed. Spec.):
MM-L-736C.....Lumber; Hardwood

H. Commercial Item Description (CID):
A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

I. Military Specification (Mil. Spec.):
MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

J. Truss Plate Institute (TPI):
TPI-1-2007.....Metal Plate Connected Wood Trusses

K. U.S. Department of Commerce Product Standard (PS)
PS 1-07.....Structural Plywood

PS 20-05.....American Softwood Lumber Standard

PART 2 - PRODUCTS

2.1 LUMBER:

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
   1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
   2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA, National Design Specification for Wood Construction having design stresses as shown.

C. Lumber Other Than Structural:
   1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
   2. Framing lumber: Minimum extreme fiber stress in bending of 1100.
   3. Furring, blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.

D. Sizes:
   1. Conforming to Prod. Std., PS20.
   2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:
   1. At time of delivery and maintained at the site.
   2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
   3. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:
   1. All concealed wood shall be fire retardant treated.
   2. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
   3. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:
   1. Do not treat Heart Redwood and Western Red Cedar.
   2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
   3. Treat other members specified as preservative treated (PT).
   4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.2 PLYWOOD

A. Comply with Prod. Std., 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 15 mm (19/32 inch) thick plywood, unless specified otherwise.
   3. Ceiling sheathing:
   Unless required by Structural, provide:
      a. Minimum 18 mm (23/32 inch) thick plywood, unless specified otherwise.

2.3 STRUCTURAL-USE PANELS

A. Comply with APA.
B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.
C. Wall and Ceiling Sheathing:
   1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 400 mm (16 inches) on center and 24/0 or greater for supports 600 mm (24 inches) on center.

2.4 ROUGH HARDWARE AND ADHESIVES:

A. Anchor Bolts:

1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
2. Extend at least 200 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. Use 13 mm (1/2 inch) bolt unless shown otherwise.

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

D. Screws:
1. Wood to Wood: ANSI 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. Use 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. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
1. AFPA National Design Specification for Wood Construction for timber connectors.
2. AITC Timber Construction Manual for heavy timber construction.
3. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.
4. APA for installation of plywood or structural use panels.
5. ASTM F 499 for wood underlayment.
6. TPI for metal plate connected wood trusses.

B. Fasteners:
   1. Nails.
      a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing 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, select length of nails sufficient to extend 25 mm (1 inch) into supports.
      d. Use eight penny or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
      e. Use 16 penny or larger nails for nailing through 50 mm (2 inch) thick lumber.
   2. Bolts:
      a. Fit bolt heads and nuts bearing on wood with washers.
      b. Countersink bolt heads flush with the surface of nailers.
      c. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
      d. Use toggle bolts to hollow masonry or sheet metal.
      e. Use 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 600 mm (24 inch) intervals between end bolts. Use 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 C 954 for steel over 0.84 mm (0.033 inch) thick.
   4. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.
   5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.
   6. Screws to Join Wood:
      a. Where shown or option to nails.
      b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
      c. Spaced same as nails.

C. Set sills or plates level in full bed of mortar on masonry or concrete walls.

1. Space anchor bolts 1200 mm (4 feet) on centers between ends and within 150 mm (6 inches) of end. Stagger bolts from side to side on plates over 175 mm (7 inches) in width.
2. Use shims of slate, tile or similar approved material to level wood members resting on concrete or masonry. Do not use wood shims or wedges.
3. Closely fit, and set to required lines.

D. Cut notch, or bore in accordance with NFPA Manual for House-Framing for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

E. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking.
4. 4. Layers of Blocking or Plates:
   a. Stagger end joints between upper and lower pieces.
   b. Nail at ends and not over 600 mm (24 inches) between ends.
   c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.
5. Unless otherwise shown, Fabricate roof edge vent strips with 6 mm by 6 mm (1/4 inch by 1/4 inch) notches, 100 mm (4 inches) on center, aligned to allow for venting of insulating concrete and venting base sheet.
6. Unless otherwise shown, use wall furring 25 mm by 75 mm (1 inch by 3 inch) continuous wood strips installed plumb on walls, using wood shims where necessary so face of furring forms a true, even plane. Space furring not over 400 mm (16 inches on centers, butt joints over bearings and rigidly secure in place. Anchor furring on 400 mm (16 inches) centers.

F. Sheathing (wall, ceiling):
1. Use plywood or structural-use panels for sheathing.
2. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
3. Set nails not less than 9 mm (3/8 inch) from edges.
4. Install 50 mm by 100 mm (2 inch by 4 inch) blocking spiked between joists, rafters and studs to support edge or end joints of panels.
5. Match and align sheathing which is an extension of work in place to existing.

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SECTION 07 22 00
ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Installation of roof and deck insulation, and vapor retarder on new construction ready to receive roofing or waterproof membrane.

B. Repairs and alteration work to existing roof insulation.

1.2 RELATED WORK

A. Insulating concrete systems: Section 03 52 00, LIGHTWEIGHT CONCRETE ROOF INSULATION; combination polystyrene and insulating concrete systems

B. Wood blocking and edge strips: Section 06 10 00, ROUGH CARPENTRY.

C. Sprayed urethane insulation: Section 07 56 00, FLUID-APPLIED ROOFING.

D. Sheet metal components: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 QUALITY CONTROL

A. Supervision of work by persons that are knowledgeable and experienced in roofing. See submittals for documentation of supervisors qualification.

B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.

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. Asphalt materials, each type
2. Roofing cement, each type
3. Roof insulation, each type
4. Fastening requirements
5. Insulation span data for flutes of metal decks

C. Samples:

1. Roof insulation, each type
2. Nails and fasteners, each type

D. Certificates:

1. Indicating type, thickness and thermal conductance of insulation. (Average thickness for tapered insulation).

2. Indicating materials and method of application of insulation system on metal decks meet the requirements of Factory Mutual Research Corporation for Class 1 Insulated Steel Deck Roofs.

E. Laboratory Test Reports: Thermal values of insulation products.

F. Layout of tapered roof system showing units required.

G. Documentation of supervisors training and experience showing knowledge of roofing procedures.

1.5 DELIVERY, STORAGE AND MARKING

A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer or seller.

B. Keep materials dry, and store in dry, weathertight facilities or under canvas tarps. Use of polyethylene or plastic tarps to cover materials is not permitted. Store above ground or deck level on wood pallets. Cover ground under stored materials with plastic tarp.

1. Store rolled materials (felts, base sheets, paper) on end. Do not store materials on top of rolled material.
2. Store foam insulation away from areas where welding is being performed and where contact with open flames is possible.

C. Protect from damage from handling, weather and construction operations before, during, and after installation.

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. Federal Specifications (Fed. Spec.):

UU-B-790A.....Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

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

C208-08e1.....Cellulosic Fiber Insulating Board

C209-07ae1.....Test Methods for Cellulosic Fiber Insulating Board

C552-07.....Cellular Glass Thermal Insulation

C726-05e1.....Mineral Fiber Roof Insulation Board

C728-05.....Perlite Thermal Insulation Board

C1289-08.....Faced Rigid Cellular Polyisocynurate Thermal Insulation Board

D41-05.....Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

D312-00(R2006).....Asphalt Used in Roofing

D2178-04.....Asphalt Glass Felt Used in Roofing and Waterproofing

D2822-05.....Asphalt Roof Cement

F1667-05.....Driven Fasteners: Nails, Spikes, and Staples

D. Factory Mutual Global (FM):

1-28.....Winds Loads to Roof Systems and Roof Deck Securement

P7825-05.....Approval Guide

E. National Roofing Contractors Association (NRCA):

The NRCA Roofing and Waterproofing Manual - Fifth Edition.

F. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory (2003)

G. U.S. Department of Commerce (NBS):

PS 1-07.....Structural Plywood

H. National Particleboard Association (NPA):

A208.1-99.....Mat-Formed Wood Particleboard

1.7 QUALITY ASSURANCE:

Roof insulation on combustible or steel decks shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E 84. Insulation bearing the UL label and listed in the UL Building Materials Directory as meeting the flame spread and smoke developed ratings will be accepted in-lieu-of copies of test reports. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the type used for this project and the construction is listed as fire-classified in the UL Building Materials Directory or listed as Class I roof deck construction in the FM P7825. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

PART 2 - PRODUCTS

2.1 ASPHALT MATERIALS

A. Primer: ASTM D41.

B. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.

C. Glass (Felt): ASTM D2178, Type IV, heavy duty ply sheet.

D. Venting Asphalt Base Sheet: ASTM D3672, Type I or Type II.

E. Roof Cement: ASTM D2822, Type I or Type II, asbestos free; or, D4586, Type I or Type II.

2.2 INSULATION

A. Cellular Glass: ASTM C552, Type IV, roof board.

B. Mineral Fiberboard: ASTM C726.

C. Perlite Board: ASTM C728.

D. Isocyanurate Board: ASTM C1289, Type I, Class 2 or Type III.

E. Cellulosic Fiberboard: ASTM C208, Roof Insulating Board Grade.

1. Fiberboard shall contain not less than 0.50 percent by weight of pentachlorophenate, or not less than 0.25 percent by weight of copper pentachlorophenol, or not less than 0.30 percent by weight of arsenic oxide, or other equivalent preservative chemical treatment. Uniformly distribute chemical throughout board by absorption and filtration during process of manufacturing.
2. Manufacturer shall mark each package, giving kind of chemical and guarantee minimum quantity contained.

F. Nail base insulating board:

1. Top surface not less than 10 mm (3/8 inch) thick plywood, waferboard or wood particleboard nail base surface.
   a. Plywood: NBS PS 1, Exposure 1.
   b. Particleboard: ANSI A208.1, Type 1 Grade 1-M-2 or Type 2, Grade 2-M-2.
2. Insulation: Isocyanurate or urethane conforming to material specifications.
3. Bottom surface faced with felt facers.

G. Tapered Roof Insulation System Segments:

1. Fabricate of mineral fiberboard, isocyanurate, perlite board, or cellular glass. Use only one insulation material for tapered sections.
2. Cut to provide high and low points with crickets and slopes as shown.

3. Minimum thickness of tapered sections; 13 mm (1/2 inch), unless manufacturers allow taper to zero mm (inch).

2.3 MISCELLANEOUS

A. Building Paper (Sheathing Paper):

1. Fed. Spec. UU-B-790, Type I, Barrier paper, Grade D, Water - Vapor permeable, Style 1a, Uncreped, not reinforced; or, Style 1b, Uncreped, not reinforced, red rosin sized.
2. Weighing approximately 3 kg/10 m^2 (six pounds per 100 square feet).

B. Tapered Edge Strips:

1. Tapered 1:12 (one inch per foot), from 0 mm (0 inches), 300 mm to 450 mm (12 inches to 18 inches) wide.
2. Cellulosic Fiberboard: ASTM C208.
3. Mineral Fiberboard: ASTM C726.
4. Perlite Board: ASTM C728.

2.4 FASTENERS

A. Staples and Nails: ASTM F1667. Type as designated for item anchored and for substrate.

B. Nails for securing base sheets, and first ply of vapor retarder, to wood nailers and deck:

1. Type I, Style 20, zinc coated steel roofing nails with minimum head diameter of 10 mm (3/8 inch) through metal discs at least 25 mm (one inch) across; or,
2. One piece nails with an integral flat cap at least 24 mm (15/16 inch) across.

C. Nails for securing building paper and dry felt edge strips to wood nailer and decks:

1. Type I, Style 20, zinc coated steel roofing nails, 16 mm (5/8 inch) minimum head diameter.
2. Type IV, staples, Style 3, flat top crown, zinc coated may be used.

D. Nails into plywood: Annular thread type of length to provide at least 19 mm (3/4 inch) penetration.

E. Nails for securing venting base sheet to insulating concrete:

1. Self-clinching type of galvanized steel having an integral flat cap at least 25 mm (one inch) across.
2. Nails shall have a holding power of not less than 27 kg (60 pounds) when pulled from 11.7 kg (25.8 pounds) density insulating concrete.

F. Nails for securing base sheet, building paper, or first ply of vapor retarder to structural wood fiber decks:
   1. Self-clinching type having an integral flat cap not less than 25 mm (one inch) across.
   2. Nails shall have a holding power of not less than 18 kg (40 pounds) per fastener.

G. Nails for securing insulation venting base sheet to poured gypsum roof deck:
   1. Special shaped nail providing diverging or hooking point.
   2. Nail shall have flat cap not less than 30 mm (1-1/4 inch) across and shall have a withdrawal resistance of not less than 18 kg (40 pounds) per fastener.

H. Fasteners for securing insulation to steel decks:
   1. Conform to requirements of Factory Mutual Research Corporation for wind uplift.
   2. Self-drilling galvanized screws with 50 mm (two inch) diameter disk.
   3. Antibackout thread design.
   4. Have a pullout resistance of 14 kg (30 pounds) minimum.

2.5 RECOVERED MATERIALS

A. Comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Perlite composite board	23 percent post consumer recovered paper
Plastic rigid foams: Polyisocyanurate/polyurethane	
Rigid foam	9 percent recovered material
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material
Rock wool material	75 percent recovered material

B. 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 GENERAL

A. Do not apply roof insulation if deck will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon.

B. Entire roof deck construction of any section of the building shall be completed before insulation system work is begun. Curbs, blocking, edge strips, and other components which insulation, roofing and base flashing is attached to shall be in place ready to receive insulation and roofing. Coordinate roof insulation operations with roofing and sheet metal work so that insulation is installed to permit continuous roofing operations.

C. Insulation system materials shall be dry and damage free when applied. Do not use broken insulation or insulation with damaged facings. Remove damaged insulation from the site immediately.

D. Dry out surfaces , including the flutes of metal deck, that become wet from any cause during progress of the work before roofing work is resumed. Apply materials only to dry substrates.

E. Except for temporary protection specified, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, fog, snow, ice) or frost is present in any amount in or on the materials when temperature is below 10 □C (50 □F). Do not apply materials to substrate having temperature of 10 □C (50 □F) or less.

F. Phased construction is not permitted. The complete installation of all flashing, insulation, and roofing shall be completed in the same day except for the area where temporary protection is required when work is stopped.

G. Temporary Protection for Built-Up Roofing:

1. Install temporary protection consisting of glaze coats and water cutoffs 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.
2. Glaze coat all exposed surfaces of insulation and felts to seal within the bitumen coating. No insulation or felt surfaces or edges shall be left exposed.
3. Provide water cutoffs at exposed edges of insulation. Cutoffs shall consist of two plies of felt. The first ply extending 150 mm (six

inches) beyond edge of roof insulation, the roof deck and the built-up roofing. The second ply covering the first ply and extending 75 mm (three inches) beyond the first. Install as specified for vapor retarder. When the work resumes, cut the protective felts along the vertical face of insulation and remove, exposing the edges of the insulation.

4. Securely anchor insulation in place to prevent blow off and damage by construction activities.
5. Provide for removal of water or drainage of water away from work.
6. For roof areas that are to remain intact and that are subject to foot traffic and damage, provide wood walkways with notches in sleepers to permit free drainage.

H. Heating Bitumen:

1. Heat the asphalt to the equiviscous temperature plus or minus 14 □C (25 □F), at the time of application.
   a. Asphalt shall not be heated more than 38 □C (100 □F) above the equiviscous temperature.
   b. When the equiviscous temperature is not furnished by the asphalt manufacturer, asphalt shall not be heated above 274 □C (525 □F) for Type III and IV and shall be not less than 246 □C (475 □F) at time of application.
2. At no time shall bitumen be heated above the flash point temperature.
3. Provide heating kettles with a thermometer kept in operating condition. Kettlemen shall be in attendance at all times during heating to insure that the bitumens are heated within the temperatures specified.

I. Use Type III or Type IV asphalt between plies of felt and for installing insulation and vapor retarders.

J. Application of Materials with Hot Bitumen:

1. Apply bitumen in quantities required, immediately followed by materials to be embedded therein, before bitumen cools below the application temperature limit.
   a. Do not apply more material than can be covered at one time, except for glaze coats.
   b. Recoat cooled bitumen areas.

K. Primer: Use four liters (one gallon) of primer per 10 m^2 (100 square feet).

L. Quantities of Asphalt:

1. Per square unless otherwise specified.
2. Between insulation layers and deck or vapor retarder: 9 to 14 kg (20 to 30 pounds).
3. Glaze coats: 7 to 11 kg (15 to 25 pounds).

M. Building Paper (Red rosin):

1. Lay paper smoothly without buckles or wrinkles at right angles to the roof slope, starting at the low point.
2. Lap each sheet of paper at least 50 mm (two inches) over preceding sheet, and at ends.
3. Staple or nail sufficiently to hold in place until the vapor retarder and/or insulation is installed.

3.2 SURFACE PREPARATION

A. Sweep decks to broom clean condition. Remove all dust, dirt or debris.

B. Remove projections that might damage materials.

C. Concrete Decks, Except Insulating Concrete:

1. Test concrete decks for moisture prior to application of materials. Heat bitumen as specified and pour approximately 0.5 liters (one pint) of bitumen on surface to which roofing materials are to be applied. If bitumen foams upon contact with the deck or after bitumen has cooled and bitumen is stripped clean from deck leaving no residue, the deck is not dry enough for application of prime coat and subsequent work.
2. Prime concrete decks, including precast unit, with primer and allow to dry before application of bitumen. Keep primer back 100 mm (four inches) from joints in precast unit.

D. Insulating Concrete:

1. Allow to dry out for at least five days after installation before the placement of subsequent materials or insulation.
2. If rain occurs during or at end of drying period or during installation, allow additional drying time before continuing the placement of the subsequent materials or insulation.

E. Poured gypsum shall be dried out in accordance with manufacturer's printed instructions prior to application of subsequent materials.

F. Cover wood sheathing, poured gypsum, gypsum plank, and cement wood fiber plank with a layer of building paper (red rosin).

G. Existing Roofs:

1. At areas to be altered or repaired, remove loose insulation and wet insulation.
2. Cut and remove existing insulation and vapor retarder for new work to be installed. Clean cut edges and install a temporary seal to cut surfaces. Use roof cement and one layer of 7 kg (15 pound) felt strip cut to extend 150 mm (6 inches) on each side of cut surface. Bed strip in roof cement and cover strip with roof cement to completely embed the felt.

3.3 VAPOR RETARDER

A. General:

1. Install a vapor retarder when phenolic insulation is used.
2. At vertical surfaces, turn up vapor retarder to top of insulation or base flashing.
3. At all pipes, walls, and similar penetrations through vapor retarder, seal openings with roof cement to prevent moisture entry from below.
4. Mop felts solidly in place as specified.
5. Seal penetrations with roof cement.

B. Poured Gypsum Decks:

1. Apply two plies of asphalt saturated felt.
2. Lay first ply down dry; do not mop to deck. Mop second ply to first ply at laps.
3. Nail both plies to deck as specified.
4. Option: Apply one ply of base sheet laid down dry with mineral aggregate surface down. Lap and seal edges, nailing down as specified.

C. Steel Deck:

1. Material and method of application of roofing systems used on metal decks shall meet the requirements of Underwriters Laboratories for Class A or Factory Mutual Research Corporation for Class I Insulated Steel Roof Deck.
2. Mechanically anchor a 25 mm (one inch) thick layer of mineral fiber board, cellular glass, or perlite board to meet the requirements of

Factory Mutual Research Corporation for Class 1-90 Insulated Steel Deck Roofs.

3. Locate the long dimension edge joints to have solid bearing on top of decking ribs; do not cantilever over rib openings or flutes.
4. Apply two plies of asphalt saturated felt in hot bitumen to insulation board.

3.4 SELECTION OF RIGID INSULATION

A. Insulation Type:

1. Use either cellular glass, mineral fiberboard, perlite board, phenolic board, isocyanurate board, or urethane board or a combination thereof.
2. Use not less than two layers of insulation unless specified otherwise.
3. Use either 25 mm (one inch) thick mineral fiberboard, cellular glass, or perlite board as first layer over steel decks. Do not use phenolic, isocyanurate, or urethane board type insulation directly on steel roof decks.
4. Use either 13 mm (1/2 inch) thick perlite board or mineral fiber board as a top layer over urethane board or isocyanurate board. Composite board is acceptable.
5. Use only cellular glass block for plaza or promenade decks.
6. Where tapered insulation is used, all insulation shall be factory tapered, except perlite board may be field tapered.
7. 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. Actual thickness shall provide the thermal resistance "R" value of not less than 19 for uniform thickness. (average thickness where tapered insulation is used).
2. The minimum thickness of insulation for metal decks shall not be less than recommended by the insulation manufacturer to span the rib opening (flute size) of the metal deck used.
3. When thickness of insulation to be used is more or less than that shown on the drawings, make adjustments in the alignment and location of roof drains, flashing, gravel stops, fascias and similar items at no additional cost to the Government.

4. Where tapered insulation is used, the thickness of the insulation at high points and roof edges shall be as shown on the drawings; the thickness at the low point (drains) shall be not less than 38 mm (1-1/2 inches).
5. Use not less than two layers of insulation when insulation is 25 mm (one inch) or more in thickness unless specified otherwise.

3.5 INSTALLATION OF INSULATION

A. Lay insulating units with close joints, in regular courses and with cross joints broken. When laid in more than one layer, break joints of succeeding layers of roof insulation with those in preceding layer. Bed insulation layers in Type III or IV asphalt firmly pressed into the hot bitumen. Keep bitumen below surface of insulation to receive single ply rubber roofing.

B. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.

C. Cover all insulation installed on the same day by either:
   1. The roofing membrane as specified.
   2. Temporary protection as specified.

D. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.

E. Cut to fit tight against blocking or penetrations.

F. Over Vapor Retarder, or Concrete Deck: Lay insulation in hot bitumen as specified.

G. Over Precast Concrete Unit Decks: Lay insulation in hot bitumen keeping bitumen back 100 mm (four inches) from joints in precast concrete units.

H. Steel Deck:
   1. Material and method of application of insulation systems used on metal decks shall meet the requirements of Underwriters laboratories for Class A or Factory Mutual Research Corporation for Class I Insulated Steel Roof Deck.
   2. Mechanically anchor first layer of insulation to steel deck to conform to FM Class 1-90, Insulated Steel Roof Deck.
   3. Locate the long dimension edge joints to have solid bearing on top of deck ribs; do not cantilever over deck rib openings or flutes.

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SECTION 07 24 00
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

Exterior Finish Systems specified in this section consist of simulated synthetic stucco finish, and Exterior Insulation and Finish System (EIFS); all of which are applied over cement board sheathing.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:
Two 300 mm (one-foot) square samples of the, EIFS, simulated synthetic stucco, finishes over cement board identical to the proposed installation in thickness, color, texture, insulation, and workmanship.

C. Test Reports and Manufacturer's Literature
1. Manufacturer's literature and instructions for installation of the system. Include manufacturer's recommended details for corner treatment, sills, soffits, dentils, quoins, lintels, openings and other special applications.
2. Summary of test results by the Exterior Finish System manufacturer to substantiate compliance with the specified performance requirements. Furnish complete test reports as required.
3. Statement by Exterior Finish System manufacturer that all components of the system proposed for use on this project are approved by that manufacturer.
4. Statement by the Installer of the Exterior Finish System that they are experienced with the installation, having done at least three (3) projects using this system and can furnish names and locations of these projects if required.

1.3 DELIVERY AND STORAGE

A. Deliver materials in unopened packages with manufacturer's labels intact, legible and grade seals unbroken.

B. Store and handle in strict compliance with manufacturer's instructions. Protect from damage.

C. Remove from premises any damaged or deteriorated material.

1.4 ENVIRONMENTAL CONDITIONS

Unless a higher temperature is required by the system manufacturer, the ambient air temperature shall be 7 degrees Celsius (45 degrees F) or greater and rising at the time of installation of the system and shall be predicted to remain at 7 degrees Celsius (45 degrees F) or greater for at least 24 hours after installation.

1.5 WARRANTY

Exterior Finish system shall be warranted against water leakage past the weather resistive barrier and other defects in materials and workmanship, and shall be subject to the terms of Article "Warranty of Construction", FAR clause 52.246-21, except that the warranty period shall be ten years.

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. American Society for Testing and Materials (ASTM):

B117-07a.....Operating Salt Spray (Fog) Apparatus

C67-07a.....Sampling and Testing Brick and Structural Clay Tile

C177-04.....Steady-State Heat Flux measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C297/C297M-04A
.....Flatwise Tensile Strength of Sandwich Constructions

C578-08.....Rigid, Cellular Polystyrene Thermal Insulation

C666/C666M-03(2008)
.....Resistance of Concrete to Rapid Freezing and Thawing

C920-08.....Elastomeric Joint Sealants

D968-05e1.....Abrasion Resistance of Organic Coatings by Falling Abrasive

D2794-93(R2004).....Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

E84-08a.....Surface Burning Characteristics of Building Materials

E96 / E96M - 05
.....Water Vapor Transmission of Materials
E108-07a.....Fire Tests of Roof Coverings
E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E331-00.....Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
G90-05.....Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight

C. Exterior Insulation Manufacturers Association (EIMA)
101.01.1 Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS), Class PB (Modified ASTMC 67)
101.02.....Resistance to Water Penetration of Exterior Insulation and Finish Systems (EIFS), Class PB (Modified ASTM E 331)
101.86.....Resistance of Exterior Insulation and Finish Systems to the Effects of Rapid Deformation (Impact)

PART 2 PRODUCTS

2.1 EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

A. Description: The PB system consists of Type I molded rigid polystyrene insulation adhesively adhered to the sheathing and finished with a glass-fiber-mesh reinforced based-coat and a textured finish coat.

B. Performance Requirements:

TEST	TEST METHOD	REQUIREMENT
Flame Spread (Test samples shall include base coat, fabric, finish mounted on non- combustible substrate)	ASTM E84	Flame spread of 25 or less. Smoke developed rating 450 or less.
Full Scale Wall Fire Test	ASTM E108	No significant surface flaming or propagation of vertical or lateral flames
Impact Resistance (Sample shall be cured. Finish, base coat and fabric over 25mm (1 inch) insulation typical of project application)	EIMA 101.86 (Hemispherical Head Test)	//Standard Impact Resistance// 2.83 to 5.54J (25-49 inch-lbs) Medium Impact Resistance// 5.65 to 10.1J 50-89 inch lbs
		High Impact Resistance// 10.2 to 17J (90-150 inch-lbs) Ultra High Impact Resistance// Over 17.1J (Over 150 inch-lbs.) - No broken reinforcing fabric
Structural Performance (Test panels 1200 mm x 1200 mm (4 feet by 4 feet) typical of project application)	ASTM E330	No permanent deformation, delamination or deterioration for positive and negative pressures as required.
Water Penetration	ASTM E331	No Water penetration
Abrasion Resistance	ASTM D968	500 liters of sand-slight smoothing - no loss of film integrity
Accelerated Weathering	ASTM G90	2000 hours. No deterioration
Salt Spray Resistance	ASTM B117	Withstand 300 hours. No deleterious effects.
Water Vapor	ASTM E96	Not more than 18 grains an hour per square foot.
Absorption-Freeze-Thaw (Pre-weighed 100 mm x 200 mm (4" by 8") specimens; 25 mm (1") insulation, faced with finish coat cured and stored in air; tested with edges and back open.)	ASTM C67 50 Cycles: 20 hrs. at - 9 deg C ; 4-hr. thaw in water	After 50 cycles – Total weight gain of not more than 6.2 grams. No checking splitting, or cracking.

C. Adhesive: Manufacturers standard product including primer as required compatible with sheathing.

D. Insulation:

1. Thermal Resistance: Thermal resistance (R-value), as indicated, measured by ASTM C177.
2. Insulating Material: ASTM C578, as recommended by EIFS manufacturer and treated to be compatible with EIFS components. Age insulation a minimum of 6 weeks prior to installation.
3. Provide Type I Molded Expanded Polystyrene (MEPS) insulation board for Type PB systems, in sizes as required except no larger than 600 mm X 1200 mm (24 X 48 inches) boards, and not more than 100 mm (4 inches) in thickness. Refer to drawings for the required thickness.

E. Create a means of drainage between the insulation board and cement board sheathing.

F. All penetrations and terminations shall be flashed.

G. Mechanical Anchors: As recommended by the EIFS manufacturer.

H. Accessories: Conform to the recommendations of the EIFS manufacturer, including trim, edging, anchors, expansion joints, and other items required for proper installation of the EIFS. All metal items and fasteners to be corrosion resistant.

I. Reinforcing Fabric: Balanced, open weave, glass fiber fabric made from twisted multi-end strands specifically treated for compatibility with the other materials of the system. Minimum weight 4.3 oz/sq. yd.

J. Base Coat: For PB system, manufacturer's standard product. Minimum thickness of 1-1/2 times reinforcing fabric thickness but not less than 2.4 mm (3/32 inches) wet thickness.

K. Finish Coat: For PB system, manufacturer's standard product. Minimum thickness 1.6 mm (1/16 inch), complying with Performance Requirements in paragraph B. Finish texture shall match with the existing adjacent building.

L. Sealant: ASTM C 920; material having a minimum joint movement of 50% with 100% recovery. Type, grade and use shall be as recommended by the sealant manufacturer. When required, primer, bond breaker and backer rods shall be non-staining as recommended by the sealant manufacturer. Do not use absorptive materials as backer rods.

PART 3 EXECUTION

3.1 INSPECTION

Examine substrate, opening supports and conditions under which this work is to be performed. Notify Resident Engineer in writing of conditions detrimental to the proper completion of this work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 CONTROL JOINTS

A. See drawings for location of building control joints and surface control joints. Install surface control joints as follows:

B. Exterior Insulation and Finish System. Install at 15 meters (50 feet) maximum in both directions and at building expansion joints, floor lines and where EIFS intersects other materials per manufacturer's recommendations.

3.3 SEALANTS:

A. Apply according to manufacturer's recommendations and the following:

B. Direct Exterior Finish System/Unit Finish/: Caulk all intersections of cement board with windows, doors, control joints, other openings and locations as shown on drawings. Do not caulk locations intended for water drainage.

C. Exterior Insulation and Finish System: Apply sealant per EIFS manufacturer's recommendation. Do not seal locations intended for water drainage.

3.4 ACCESSORIES:

Install according to manufacturer's recommendation.

3.5 FINISH:

A. EXTERIOR INSULATION AND FINISH SYSTEM:

1. Insulation Board: Place horizontally from level base line. Stagger vertical joints and interlock at corners. Butt joints tightly. Provide flush surfaces at joints. Offset insulation board joints from joints in sheathing by at least 200 mm (8 inches). Do not align joints with corners of doors, windows and other openings. Do not leave insulation board exposed longer than recommended by insulation manufacturer.

2. Mechanical Fasteners: Fasten with manufacturer's standard anchors, spaced as recommended by manufacturer, but not more than 600 mm (2 feet) horizontally and vertically.

3. Sanding: Sand entire surface of insulation before application of base coat to improve bonding of basecoat, level high joints and remove dirt and weathering damage. Do not pre-fill low areas with basecoat.
4. Base Coat and Reinforcing Fabric: Trowel apply to the insulation a uniform thickness of base coat as recommended by the system manufacturer but not less than 1-1/2 times the reinforcing fabric thickness with a minimum of 2.4 mm (3/32 inch). Install reinforcing fabric in accordance with manufacturer's instructions. Provide diagonal reinforcement at opening corners, backwrapping, and any other reinforcement recommended by EIFS manufacturer. The fabric shall not be visible beneath the surface of the basecoat after installation. Cure the basecoat for a minimum of 24 hours before application of the finish coat.
5. Finish: Inspect basecoat for damage or defects and repair prior to application of finish coat. Trowel apply finish coat according to manufacturer's recommendations but a minimum of 1.6 mm (1/16 inch). Texture finish as required. Provide finish surfaces that are plumb and plane with no greater deviation than 1:500 (1/4 inch in 10 feet).

3.6 CLEAN UP:

Upon completion, remove all scaffolding, equipment, materials and debris from site. Remove all temporary protection installed to facilitate installation of system.

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SECTION 07 52 16
STYRENE-BUTADIENE-STYRENE MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies modified bituminous sheet roofing and base flashing installed on new construction with white granular or coated surface.

B. Temporary roofs.

C. Repairs and alteration work.

1.2 RELATED WORK:

A. Wood cants, blocking and wood edge strips: Section 06 10 00, ROUGH CARPENTRY.

B. Sheet metal components: Section 07 60 00, FLASHING AND SHEET METAL.

C. Miscellaneous items: Section 07 71 00, ROOF SPECIALTIES/ Section 07 72 00, ROOF ACCESSORIES.

D. Insulating Concrete Systems: Section 03 52 00, LIGHTWEIGHT CONCRETE ROOF INSULATION.

E. Repair existing sprayed foam roof: Section 07 57 13, SPRAYED POLYURETHENE FOAM ROOF applicable

F. Steel Decking: 05 31 00 STEEL DECKING

1.3 QUALITY CONTROL:

A. Supervision of work by persons those are knowledgeable and experienced in roofing.

B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to modified bituminous sheet roofing for storage, handling and application.

C. Applicator licensed by manufacturer.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, SAMPLES.

B. Manufacturer's Literature and Data:

1. Asphalt materials.
2. Modified bituminous sheet roofing.
3. Roofing cement.
4. Roof walkway pads
5. Fastening requirements.
6. Application instructions.

C. Samples:

1. Nails and fasteners, each type.
2. Cutout samples in plastic bag after testing.

D. Certificates: Indicating materials and method of application of roofing system meets requirements of Factory Mutual Research Corporation for 1-120 Roofs.

E. Warranty: As specified.

F. Laboratory Testing Reports: Roofing cutouts.

G. Documentation of supervisors training and experience showing knowledge of roofing procedure.

1.5 DELIVERY, STORAGE AND MARKING:

A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer or seller.

B. Keep materials dry, and store in dry, weathertight facilities or under canvas tarps. Use of polyethylene or plastic tarps to cover materials is not permitted:

1. Store above ground or deck level on wood pallets. Cover ground under pallet stored materials with plastic tarp.
2. Store rolled materials on end. Do not store materials on top of rolled materials.

C. Protect from damage from handling, weather and construction operations before, during, and after installation.

1.6 WARRANTY:

A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend warranty period to two years from acceptance of facility from the contractor.

B. Roof System Guarantee: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the roof system manufacturer's 20 year labor and materials roof system guarantee. The roof system guarantee shall include both the roofing and flashing membranes, and the specified new lightweight insulating concrete system consisting of aggregate fill, patented-pre-formed polystyrene panels, and base sheet fasteners. All repair or replacement costs covered under the guarantee shall be borne by the roofing membrane manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner. Specific items covered under the roof system guarantee include:

1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks;

2. Should a roof leak occur, the insulating performance of the roof insulation will be at least 80% of the design thermal resistance within a 2 year period following repair of the leak.

3. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)

4. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

C. Prefabricated Fascia/Coping/Expansion Joint System Inclusion Addendum: In addition to the specified guarantee, furnish the Owner with the manufacturer's inclusion addendum to the guarantee offering coverage of the prefabricated fascia/coping/expansion joint system under the standard terms of the Roof System Guarantee.

1.7 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. Federal Specifications (Fed. Spec.):

UU-B-790A.....Building Paper, Vegetable Fiber: (Kraft,
INT AMD 1 Waterproofed, Water Repellent And Fire Resistant)

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

C90-02.....Load Bearing Concrete Masonry Units.
D41-94(R2000).....Asphalt Primer Used in Roofing, Dampproofing and Waterproofing
D226-97.....Asphalt-Saturated Organic Felt Used in Roofing Waterproofing
D312-00.....Asphalt Used in Roofing

D3617-02.....Sampling and Analysis of New Built-up Roof Membranes

D4586-00.....Asphalt Roof Cement, Asbestos Free

D4897-01.....Asphalt Coated Glass Fiber Venting Base Sheet Used in Roofing

D6162-00.....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements

D6163-01.....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements

D6164-00.....Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements

D. Factory Mutual Engineering and Research Corporation (FM):

Annual issue.....Approval Guide Building Materials.

E. Underwriters Laboratories, Inc. (UL):

Annual issue.....Building Materials Directory

Annual issue.....Fire Resistance Directory

F. Warnock Hersey (WH):

Annual issue.....Certification Listings

G. National Roofing Contractors Association (NRCA):

The NRCA Roofing and Waterproofing Manual - Fifth Edition.

1.08 DESCRIPTION OF WORK

The basic work descriptions required in this specification are referenced below.

Base Bid

Project Type: New construction Specification #: 2030 CBT

Deck: FM Approved slotted metal Slope: 1/4 inch

Substrate: ZIC 1:4 Lightweight Insulating Concrete Roof Insulation, or approved equal.

Base Sheet: Parabase FS, mechanically attached, or approved equal.

Roof System: Paradiene 20 or approved equal, applied in PA-311 M Adhesive;

Paradiene 30 CR FR or approved equal, applied in PA-311 M Adhesive.

Flashing System: Veral Aluminum or approved equal, torch applied.

Deductive Alternate #4

Project Type: New construction Specification #: 2030 IA

Deck: Structural concrete Slope: 1/4 inch

Tapered Insulation: Tapered Paratherm system with inorganic coated glass facers, providing for a roof slope of 1/4 inch and having a thickness sufficient to provide for an average long-term thermal value of R-20, applied in Para-Stik Insulation Adhesive, or approved equal.

Insulation - top layer: DensDeck Prime by Georgia-Pacific, having a thickness of 1/2 inch, applied in Para-Stik Insulation Adhesive, or approved equal.

Roof System: Paradiene 20 or approved equal, applied in PA-311 M Adhesive;

Paradiene 30 CR FR or approved equal, applied in PA-311 M Adhesive.

Flashing System: Veral Aluminum or approved equal, torch applied.

PART 2 - PRODUCTS

2.1 ASPHALT MATERIALS:

A. Primer: ASTM D41.

B. Roof Cement: ASTM D4586, Type I or Type II.

C. Roofing Membrane Assembly: A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend. The cross sectional area of the sheet material shall contain no oxidized or non-SBS modified bitumen. The roof system shall pass 500 cycles of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F (-10°C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles. The roof system shall pass 200 cycles of ASTM D 5849 after heat conditioning performed in accordance with ASTM D 5147. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

1. Modified Bitumen Base and Stripping Ply

a) Thickness (avg): 91 mils (2.3 mm) (ASTM D 5147)
b) Thickness (min): 87 mils (2.2 mm) (ASTM D 5147)
c) Weight (min per 100 ft² of coverage): 62 lb (3.0 kg/m²)
d) Peak filler content in elastomeric blend - 35% by weight
e) Low temperature flexibility @ -15°F (-26°C): PASS (ASTM D 5147)
f) Peak Load (avg) @ 73°F (23°C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)
g) Peak Load (avg) @ 0°F (-18°C): 70 lbf/inch (12.3 kN/m) (ASTM D 5147)
h) Ultimate Elongation (avg.) @ 73°F (23°C): 50% (ASTM D 5147)
i) Compound Stability (max): 0.1% (ASTM D 5147)
j) High Temperature Stability (min): 250°F (121°C) (ASTM D 5147)
k) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)
l) Reinforcement: fiberglass mat or other meeting the performance and Compound stability criteria

2. Modified Bitumen Finish Ply

a) Thickness (avg): 130 mils (3.3 mm) (ASTM D 5147)
b) Thickness at selvage (coating thickness) (avg): 98 mils (2.5 mm) (ASTM D 5147)
c) Thickness at selvage (coating thickness) (min): 94 mils (2.4 mm) (ASTM D 5147)
d) Weight (min per 100 ft² of coverage): 90 lb (4.4 kg/m²)
e) Peak filler content in elastomeric blend: 35% by weight
f) Low temperature flexibility @ -15° F (-26° C): PASS (ASTM D 5147)
g) Peak Load (avg) @ 73°F (23°C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)
h) Peak Load (avg) @ 0°F (-18°C): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)
i) Ultimate Elongation (avg.) @ 73°F (23°C): 55% (ASTM D 5147)
j) Compound Stability (max): 0.1% (ASTM D 5147)
k) High Temperature Stability (min): 250°F (121° C) (ASTM D 5147)
l) Granule Embedment (max loss): 2.0 grams per sample (ASTM D 5147)
m) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)
n) Reinforcement: fiberglass mat or other meeting the performance and Compound stability criteria
o) Surfacing: synthetic reflective chips

G. Flashing Membrane Assembly: A flashing membrane assembly consisting of a prefabricated, reinforced, Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane with a continuous, channel-embossed metal-foil surfacing. The finish ply shall conform to ASTM D 6298 and the following physical and mechanical property requirements.

1. Cant Backing Sheet and Flashing Reinforcing Ply

a) Thickness (avg): 102 mils (2.6 mm) (ASTM D 5147)
b) Thickness (min): 98 mils (2.5 mm) (ASTM D 5147)
c) Weight (min per 100 ft² of coverage): 72 lb (3.5 kg/m²)

d) Maximum filler content in elastomeric blend: 35% by weight
e) Low temperature flexibility @ -15° F (-26° C) - PASS (ASTM D 5147)
f) Peak Load (avg) @ 73°F (23°C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)
g) Peak Load (avg) @ 0°F (-18°C): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)
h) Ultimate Elongation (avg.) @ 73°F (23°C): 50% (ASTM D 5147)
i) Dimensional Stability (max): 0.1% (ASTM D 5147)
j) Compound Stability (min - sheet): 250°F (121°C) (ASTM D 5147)
j) Compound Stability (min – adhesive coating): 212°F (100°C) (ASTM D 5147)
k) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)
l) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria
m) Back Surfacing: polyolefin film

> Siplast Paradiene 20 SA or approved equal

2. Metal-Clad Modified Bitumen Flashing Sheet

a) Thickness (avg): 142 mils (3.6 mm) (ASTM D 5147)
b) Thickness (min): 138 mils (3.5 mm) (ASTM D 5147)
c) Weight (min per 100 ft² of coverage): 92 lb (4.5 kg/m²)
d) Coating Thickness – back surface (min): 40 mils (1 mm) (ASTM D 5147)
e) Low temperature flexibility @ 0° F (-18° C): PASS (ASTM D 5147)
f) Peak Load (avg) @ 73°F (23°C): 85 lbf/inch (15 kN/m) (ASTM D 5147)
g) Peak Load (avg) @ 0°F (-18°C): 180 lbf/inch (31.7 kN/m) (ASTM D 5147)
h) Ultimate Elongation (avg) @ 73°F (23°C): 45% (ASTM D 5147)
i) Tear-Strength (avg): 120 lbf (0.54 kN) (ASTM D 5147)
j) Dimensional Stability (max): 0.2% (ASTM D 5147)
k) Compound Stability (min): 225°F (107°C) (ASTM D 5147)
l) Cyclic Thermal Shock Stability (maximum): 0.2% (ASTM D 7051)
m) Approvals: UL Approved, FM Approved (products shall bear seals of approval)
n) Reinforcement: fiberglass scrim mat or other meeting the performance and dimensional stability criteria
o) Surfacing: aluminum metal foil equal to Siplast Veral Aluminum

H. Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquid-applied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed acrylic resin primer, basecoat and topcoat, combined with a non-woven polyester fleece. The resin and catalyst are pre-mixed immediately prior to installation. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.

2.3 FASTENERS:

A. Nails for securing flashing and base sheets to wood nailers and deck:
   1. Zinc coated steel roofing nails with minimum head diameter of 10 mm (3/8-inch) through metal discs at least one inch across.
   2. Nails with an integral flat cap at least 24 mm (15/16-inch) across.

B. Fasteners for securing building paper and dry felt edge strips to wood nailer and decks. Fastening shall meet with wind load requirement.
   1. Zinc coated steel roofing nails, 16 mm (5/8-inch) minimum head diameter.
   2. Flat top crown, zinc coated.

C. Nails for Plywood:
   1. Use annular thread type and length to penetrate plywood at least 19 mm (3/4-inch).
   2. Through flat cap at least 24 mm (15/16-inch) across.

D. Nails for Securing Flashing to Masonry:
   1. Hardened steel nails through metal discs at least 25 mm (one inch) in diameter.
   2. One piece nails with an integral flat cap at least 24 mm (15/16-inch) across.

E. Nails for Securing Venting Base Sheet to Insulating Concrete:
   1. A single unit, precision formed, electro zinc coated steel fastener having a 2.7 inch diameter rib reinforced cap and 1.7 inch long rectangular legs, designed to expand when fully driven into the lightweight concrete. Fasteners for lightweight concrete shall meet FM Standard 4470 requirements for corrosion resistance.

PART 3 - EXECUTION

3.1 GENERAL:

A. Do not apply if deck will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless system is protected.

B. Entire roof deck construction of section of the building shall be completed before roofing work is begun:
   1. Install curbs, blocking, edge strips, cants, and other components where insulation, roofing and base flashing is attached to, in place ready to receive insulation and roofing.

2. Coordinate roof operations with roof insulation and sheet metal work so that insulation and flashings are installed concurrently to permit continuous roofing operations.

C. Apply dry roofing materials.

D. Dry out surfaces, including the flutes of metal deck that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates.

E. Except for temporary protection, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, snow, ice, fog or frost) is present in any amount in or on the materials to be covered or installed:

1. Do not apply materials when the temperature is below 10°C (50 degrees F).
2. Do not apply materials to substrate having temperature of 10° C (50 degrees F) or less.

F. Temporary Protection:

1. Install temporary protection consisting of water cut offs at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
2. Install temporary cap flashing over the top of base flashings where permanent flashings are not in place to provide complete protection against moisture entering the roof system through or behind the base flashing. Securely anchor in place to prevent blow off and damage by construction activities.
3. Provide for removal of water or drainage of water away from the work.
4. Provide temporary protection for roofing by means of duckboard walkways, plywood platforms, or other materials, as approved by Resident Engineer, for roof areas that are to remain intact, and that are subject to foot traffic and damage. Provide notches in sleepers to permit free drainage.

3.2 SURFACE PREPARATION:

A. Sweep decks to broom clean condition. Remove all dust, dirt or debris.

B. Remove projections that might damage materials.

C. Concrete Decks, except Insulating Concrete:

1. Test concrete decks for moisture prior to application of roofing materials. Heat bitumen as specified and pour approximately one pint of bitumen on surface to which roofing materials are to be

applied. If bitumen foams upon contact with the deck or if after bitumen has cooled and bitumen is stripped from deck leaving no residue, the deck is not dry enough for application of prime coat or roofing.

2. Prime concrete decks, including precast units, with primer as specified. Keep primer back four inches from joints in precast units.
3. Allow primer to dry before application of bitumen.

D. Insulating Concrete:

1. Allow to dry out for at least five days after installation before the placement of materials.
2. If rain occurs during or at end of drying period or during installation of roofing, allow additional drying time before the placement of the roofing materials.

E. Existing Modified Bituminous Roofs and Repair Areas:

1. At areas to be altered or repaired, remove loose, damaged, or cut sheet that is not firmly adhered only where new penetrations occur or repairs are required.
2. Cut and remove existing roof membrane for new work to be installed. Clean cut edges and install a temporary seal to cut surfaces. Use roof cement and one layer of 7 Kg (15 pound) felt strip cut to extend 150 mm (6 inches) on each side of cut surface. Bed strip in roof cement and cover strip with roof cement to completely embed the felt.
3. At modified bituminous base flashing to be repaired, either bend up cap flashing or temporarily remove cap flashing. Brush and scrape away all deteriorated sheets or surface material of base flashing.

3.3 INSTALLATION OF MODIFIED BITUMEN MEMBRANE:

A. General:

1. Where nailers occur at roof edges under gravel stops or penetrations to receive metal base flashing, nail a continuous strip of 400 mm (16-inch) wide dry organic felt envelope over the nailers before the first ply sheet is applied. Strip shall be installed on top of venting base sheet. After membrane is installed, turn the dry felt back over the roofing, and secure in place with hot bitumen before gravel stops or other metal flanges extending out onto the membrane are installed.

2. Where cants occur at vertical surfaces, cut off roofing sheets two inches above top of cant strips, except at prefabricated curbs, scuttles and other roof accessories having integral cants, extend membrane over cant and up vertical surface to top of curb or nailer as shown.
3. Where fascia-cant occurs at roof edges, extend membrane beyond outside cant face and cut off at outside after base flashing is installed.
4. Where reglet occurs at vertical surfaces, extend plies roofing sheets up into reglet the full depth of the reglet.

B. Roofing on Nailable Decks:

1. On insulating concrete, install one ply of venting base sheet with surface down, nailed to deck with lap as specified and seal lap edges with roof cement.
2. Terminate Venting Base Sheet:
   a. At vertical surfaces: Extend venting base sheet up vertical surface over cants to top of base flashing or curb.
   b. At roof edge under gravel stops install venting base sheet over blocking: Extend base sheet not less than two inches beyond outer edge and turn down so that venting can be accomplished.
   c. At roof edge over fascia-cant: Extend base sheet over top of cant and turn down over outer face of cant to permit venting at the edge.

E. Roofing Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.

1. Apply all layers of roofing perpendicular to the slope of the deck.

2. Fully bond the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the cold adhesive applicator. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

3. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the cold

adhesive applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.

4. Heat weld all side and end laps of the modified bitumen plies during each day's application in areas where standing water accumulates.

5. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2 inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.

F. Synthetic Chip Embedment: Broadcast synthetic chips over bitumen/adhesive overruns on the finish ply surface.

G. Loose Chip Removal: Broom the surface of the finish ply in both machine and cross-machine direction using a stiff nylon bristle broom. Remove excess chips from the roof area.

3.4 BASE FLASHING:

A. Provide base flashing over cants and as necessary to make work watertight.

B. Prime vertical surfaces of masonry and concrete with asphalt primer except where vented base sheet is required to provide edge venting.

C. Flashing Application: Cut the cant backing sheet into 12 inch widths and peel the release film from the back of the sheet. Set the sheet into place over the primed substrate extending 6 inches onto the field of the roof area and 6 inches up the vertical surface utilizing minimum 3 inch laps. Set the non-combustible cant into place dry prior to installation of the roof membrane base ply. Flash walls and curbs using the reinforcing sheet and the metal foil flashing membrane. After the base ply has been applied to the top of the cant, prime the

base ply surfaces to receive the reinforcing sheet. Fully adhere the reinforcing sheet, utilizing minimum 3 inch side laps onto the primed base ply surface and up the primed wall or curb to the desired flashing height. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly. Torch apply the metal foil-faced flashing into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge. Stagger the laps of the metal foil flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of 4 inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).

D. Catalyzed Acrylic Resin Flashing System: Install the liquid-applied primer and flashing system in accordance with the membrane system manufacturer's printed installer's guidelines and other applicable written recommendations as provided by the manufacturer.

F. Except at metal fascia cants, secure top edge of base flashing with nails on a line approximately 25 mm (one inch) below top edge, spaced not more than 200 mm (eight inches) on center.
   1. Cover nail heads with roof cement.
   2. Cover the top of the base flashing with counterflashing as specified in Section 07 60 00, FLASHING AND SHEET METAL. At the fascia cants secure the top edge of the flashing with fascia compression clamp as specified in Section 07 60 00, FLASHING AND SHEET METAL.

3.5 STRIPPING:

A. Coordinate to set flanges of metal flashing in roof cement on top sheet of the modified bituminous roofing and mailing to blocking with Section 07 60 00, FLASHING AND SHEET METAL.

B. Cover that portion of the horizontal flanges of metal base flashings, gravel stops, and other flanges extending out onto the roofing with modified bituminous sheet.

C. Extend the sheet out on the roofing 150 mm six inches beyond the edge of the metal flange. Cut edge to fit tight against vertical members of flange.

D. Prime flange before stripping, embed sheet in hot bitumen.

3.6 WALKWAY PADS

A. Refer to drawings for layout. Mineral-granule-surfaced, reinforced modified asphalt composition, slip-resisting pads, manufactured as a traffic pad for foot traffic provided by roofing system manufacturer, with a pad size of 32 inch x 32 inch.

3.7 CUTOUTS AND EXAMINATION ON NEW ROOFS:

Cutouts are not required for roofs less than 370 m2 (4000 square feet) or where independent full time inspection is provided.

A. Make one cutout for each 400 m² (4300 square feet) of roof area or fraction thereof and for each days work in accordance with ASTM D3617.

B. Alternately cut one specimen 300 mm x 300 mm (12 inches by 12 inches) and then cut one sample 100 mm x 1000 mm (4 inches by 40 inches) including the insulation down to the vapor retarder. Do not cut insulating concrete.

C. Cuts shall be made in the presence of the Resident Engineer, at the locations directed by the Resident Engineer.

D. Immediately restore and repair areas of test cuts as specified with new materials.

E. Include comments and evaluation on moisture found in membrane and insulation, presence of foreign material, voids, and lack of bond between sheets and insulation plies in inspection report.

F. If examination shows that roofing does not conform to specifications, rectify the deficiency to insure a roof equal to that specified.
   1. Remedial measures required at no additional cost to the Government.
   2. Moisture, voids, and lack of adhesion found in roof system require removal and replacement.

- - - E N D - - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 – GENERAL

1.1 DESCRIPTION

Liquid Applied Flashings, formed sheet metal work for flashing, and insulated expansion joint covers are specified in this section.

1.2 RELATED WORK

A. Section 07 52 16, STYRENE-BUTADIENE-STYRENE MODIFIED BITUMINOUS MEMBRANE ROOFING.

B. Sealant compound and installation: Section 07 92 00, JOINT SEALANTS.

C. Integral, factory fabricated flashing components of manufactured roof specialties and accessories or equipment: Section 07 71 00, ROOF SPECIALTIES, Section 07 72 00 ROOF ACCESSORIES, and Division 22, PLUMBING.

G. Paint materials and application: Section 09 91 00, PAINTING.

H. Flashing of Roof Drains: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING; Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING; Section 22 11 00, FACILITY WATER DISTRIBUTION; Section 22 14 00, FACILITY STORM DRAINAGE.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

Flashings
Copings
Gravel Stop-Fascia
Gutter and Conductors
Expansion joints
Fascia-cant

C. Manufacturer's Literature and Data:

Two-piece counter flashing
Thru wall flashing
Expansion joint cover, each type
Non-reinforced, elastomeric sheeting
Copper clad stainless steel
Polyethylene coated copper
Bituminous coated copper

Copper covered paper

Fascia-cant

D. Certificates: Stating that aluminum has been given – specified, finish, thickness of anodizing. Coating formulators approvals as specified.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below for 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):

A167-99(R 2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A653/A653M-08.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process

B32-08.....Solder Metal

B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B370-03.....Copper Sheet and Strip for Building Construction

D173-03.....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

D412-06ae1.....Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1187-97 (R2002)e1.....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D1784-07.....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

C. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI):

ES-1-2003.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual (2003 Edition).

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

AMP 500-06.....Metal Finishes Manual

F. American Architectural Manufacturers Association (AAMA):
2604-02..... Voluntary Specification, Performance Requirements and Test Procedures for High Performing Organic Coatings on Aluminum Extrusions and Panels

G. Federal Specification (Fed. Spec):
A-A-1925A.....Shield, Expansion; (Nail Anchors)
UU-B-790A.....Building Paper, Vegetable Fiber

H. International Building Code (IBC): 2007 Edition

PART 2 – PRODUCTS

2.01 LIQUID APPLIED FLASHINGS

A. Where Parapro Membrane Flashing is noted on drawings, provide fluid applied flashing system equal to Parapro 123 Flashing System by Siplast.

2.1 MATERIALS

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Stainless Steel: ASTM A167, Type 302B, dead soft temper.

C. 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 Kynar color shall have the same structural properties as alloy 3003-H14.

D. Galvanized Sheet: ASTM, A653.

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

F. 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).

G. Bituminous Paint: ASTM D1187, Type I.

H. Fasteners:

1. Use stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
   a. Minimum diameter for aluminum nails 3 mm (0.105 inch).
   b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
   c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
3. Rivets: Not less than 3 mm (1/8 inch) diameter.
4. Expansion Shields: Fed Spec A-A-1925A.

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

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

K. Roof Cement: ASTM D4586.

2.2 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):
1. Stainless steel: 0.25 mm (0.010 inch) thick.
2. Galvanized steel: 0.5 mm (0.021 inch) thick.

C. Exposed Locations:
1. Stainless steel: 0.4 mm (0.015 inch, unless otherwise noted.

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

2.3 FABRICATION, GENERAL

A. Jointing:
1. In general, stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
3. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
   b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Soldering:
   a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel.

b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.

c. Completely remove acid and flux after soldering is completed.

B. 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 or minimum 0.6 mm (0.024 inch) thick stainless steel, or 1.25 mm (0.050 inch) thick aluminum to match existing.
3. Use material compatible with sheet metal to be secured by the edge strip.

4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).
6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.8 mm (0.031 inch) thick stainless steel, or 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 2003.

G. Metal Options:
For alteration work and small projects, match existing metals.
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.
3. Where copper gravel stops, copings and flashings will carry water onto cast stone, stone, or architectural concrete, or stainless steel.

2.4 FINISH

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, unless otherwise specified.

C. Finish all metal surfaces exposed to view from ground level sidewalk to be prefinished Aluminum with Kynar finish, unless specified otherwise:

1. Stainless Steel: Finish No. 2B or 2D.
2. Aluminum:
   a. Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1 Architectural, 18 mm (0.7 mils) thick.
   b. Colored Finish: Coil Coated Kynar Finish. Dyes will not be accepted.
   c. Mill finish.
3. Steel and Galvanized Steel:
   a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.
   b. Manufacturer's finish:
      1) Baked on prime coat over a phosphate coating.
      2) Baked-on prime and finish coat over a phosphate coating.
      3) Fluorocarbon Finish: AAMA 605, high performance organic coating.

2.5 THROUGH-WALL FLASHINGS

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.

1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
2. Fabricate so keying nests at overlaps.

B. For Masonry Work When Concealed Except for Drip:

1. Either stainless steel, or copper clad stainless steel.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.

C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:

1. Use same metal and thickness as counter flashing.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.

3. Form exposed portion as snap lock receiver for counter flashing upper edge.

D. For Flashing at Architectural Precast Concrete Panels or Stone Panels.
1. Use plan flat sheet of stainless steel.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:
1. Use either stainless steel, copper clad stainless steel plane flat sheet, or non-reinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.
2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
3. Turn up back edge as shown.
4. Form exposed portion with drip as specified or receiver.

F. Door Sill Flashing:
1. Where concealed, 0.5 mm (0.018 inch) thick stainless steel.
2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use 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.

2.6 BASE FLASHING

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

B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).

C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.

D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.

E. Pipe Flashing: (Other than engine exhaust or flue stack)

1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
   a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
   b. Allow for loose fit around and into the pipe.
4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
   a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
   b. Allow for loose fit around pipe.

2.7 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. Either stainless steel or aluminum, unless specified otherwise.

B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:

1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
4. Manufactured assemblies may be used.
5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:

1. Back edge turned up and fabricate to lock into reglet in concrete.
2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:
   1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
   2. Counterflashing upper edge designed to snap lock into receiver.

E. Surface Mounted Counterflashing; one or two piece:
   1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
   2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
   3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

F. Pipe Counterflashing:
   1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
   2. Fabricate 100 mm (4 inch) over lap at end.
   3. Fabricate draw band of same metal as counter flashing. Use 0.6 Kg (24 oz) copper or 0.33 mm (0.013 inch) thick stainless steel or copper coated stainless steel.
   4. Use stainless steel bolt on draw band tightening assembly.
   5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.

G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.8 GRAVEL STOPS

A. General:
   1. Fabricate in lengths not less than 2400 mm (8 feet) long and maximum of 3000 mm (10 feet).

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

B. Formed Flat Sheet Metal Gravel Stops and Fascia:
1. Fabricate as shown of .05 mm (0.018 inch) thick stainless steel, or 1.25 mm (0.050 inch) thick aluminum.
2. When fascia exceeds 150 mm (6 inches) in depth, form one or more horizontal stops not less than 13 mm (1/2 inch) high in the fascia.
3. Fabricate as two-piece fascia when fascia depth exceeds 250 mm (10 inches).
4. At joint between ends of sheets, provide a concealed clip soldered or welded near one end of each sheet to hold the adjoining sheet in lapped position. The clip shall be approximately 100 mm (4 inches) wide and shall be the full depth of the fascia less 25 mm (one inch) at top and bottom. Clip shall be of the same thickness as the fascia.
5. Provide edge strip as specified with lower hooked edge bent outward at an angle of 45 degrees.

C. Formed (Corrugated Sheet) Sheet Metal Gravel Stops and Fascia:
1. Fabricate as shown of 0.4 mm (0.015 inch) thick stainless steel, or 0.8 mm (0.032 inch) thick aluminum.
2. Sheets shall have 2 mm (1/16 inch) deep corrugations either transversely or diagonally rolled into the sheet. Crimped sheets are not acceptable.
3. Factory fabricate prepackaged system, complete with fastenings.

4. Provide concealed flashing splice plate at joints not less than 150 mm (6 inches) long and continuous edge strip at lower edge of fascia made from same metal.
5. Fabricate as two-piece fascia when fascia depth exceeds 175 mm (7 inches).

2.9 BITUMEN STOPS

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

2.10 SPLASH PANS

A. Fabricate of 1.25 mm (0.050 inch) thick aluminum.
B. Fabricate in accordance with Architectural Sheet Metal Manual Plate 35 with not less than two ribs as shown in alternate section.

2.11 REGLETS

A. Fabricate reglets of one of the following materials:
   1. Stainless steel, not less than 0.3 mm (0.012 inch) thick.
   2. Plastic coated extruded aluminum, not less than 1.4 mm (0.055 inch) thick prefilled with butyl rubber sealer and complete with plastic wedges inserted at 1000 mm (40 inches) on centers.
   3. 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.

2.12 INSULATED EXPANSION JOINT COVERS

A. Either type optional, use only one type throughout.

B. Types:

1. Construct of two preformed, stainless steel strips, not less than 0.4 mm (0.015 inch) thick, mechanically and adhesively bonded to both sides of a 2 mm (1/16 inch) thick neoprene or butyl sheet, or to a 0.4 mm (32 mil) thick reinforced chlorinated polyethylene sheet. Adhesively attach a 10 mm (3/8 inch) thick sheet of closed cell, neoprene foam insulation, to the underside of the neoprene, butyl, or chlorinated polyethylene sheet.
2. Constructed of a 2 mm (1/16 inch) thick vinyl sheet, flanged at both sides with stainless steel strips not less than 0.4 mm (0.015 inch) thick. Vinyl sheet locked and encased by the stainless steel strip and pre-punched for nailing. A 10 mm (3/8 inch) thick closed cell polyvinyl chloride foam insulating strip shall be heat laminated to the underside of the vinyl sheet between the stainless steel strips.

C. Expansion joint covers shall have factory fabricated mitered corners, crossing, tees, and other necessary accessories. Furnish in the longest available lengths.

D. Metal flange of sufficient width to extend over the top of the curb and down curb sides 50 mm (2 inches) with hemmed edge for lock to edge strip.

2.13 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING

A. Flashing at penetrations through roofing shall consist of a metal collar, sheet metal flashing sleeve and hood.

B. Fabricate collar with roof flange of 1.2 mm (0.047 inch) minimum thick black iron or galvanized steel sheet.

1. Fabricate inside diameter of collar 100 mm (4 inches) larger than the outside diameter of the item penetration the roofing.
2. Extend collar height from structural roof deck to not less than 350 mm (14 inches) above roof surface.
3. Fabricate collar roof flange not less than 100 mm (4 inches) wide.
4. Option: Collar may be of steel tubing 3 mm (0.125 inch) minimum wall thickness, with not less than four, 50 mm x 100 mm x 3 mm (2 inch by 4 inch by 0.125 inch) thick tabs bottom edge evenly spaced around tube in lieu of continuous roof flange. Full butt weld joints of collar.

C. Fabricate sleeve base flashing with roof flange of either copper, stainless steel, or copper clad stainless steel.

1. Fabricate sleeve roof flange not less than 100 mm (4 inches) wide.

2. Extend sleeve around collar up to top of collar.
3. Flange bottom of sleeve out not less than 13 mm (1/24 inch) and soldered to 100 mm (4 inch) wide flange to make watertight.
4. Fabricate interior diameter 50 mm (2 inch) greater than collar.

D. Fabricate hood counter flashing from same material and thickness as sleeve.
1. Fabricate the same as pipe counter flashing except allow not less than 100 mm (4 inch) lap below top of sleeve and to form vent space minimum of 100 mm (4 inch) wide.
2. Hem bottom edge of hood 13 mm (1/2 inch).
3. Provide a 50 mm (2 inch) deep draw band.

E. Fabricate insect screen closure between sleeve and hood. Secure screen to sleeve with sheet metal screws.

2.14 SCUPPERS

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

2.15 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 counter-flashing 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 counter-flashings, lap base flashings at least 100 mm (4 inches)and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
11. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
14. Continue flashing around columns:
    a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
    b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.

C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).

D. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.

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

F. Lintel Flashing when not part of shelf angle flashing:
   1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
   2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
   3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

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

H. Door Sill Flashing:
   1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.

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

I. Flashing at Masonry, Stone, or Precast Concrete Copings:
1. Install flashing with drips on both wall faces unless shown otherwise.
2. Form penetration openings to fit tight against dowel or other item with edge turned up. Seal penetrations with sealant.

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.
1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. General:

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counter-flashing:
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 Counter-flashing:
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 counter-flashing 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 or each section of reglet and securely hold in position until concrete or mortar are hardened:

1. Coordinate reglets for anchorage into concrete with formwork construction.
2. Coordinate reglets for masonry to locate horizontally into mortar joints.

3.6 GRAVEL STOPS

A. General:

1. Install gravel stops and fascias with allowance for expansion at each joint; minimum of 6 mm (1/4 inch).
2. Extend roof flange of gravel stop and splice plates not less than four inches out over roofing and nail or screw to wood nailers. Space fasteners on 75 mm (3 inch) centers in staggered pattern.
3. Install continuous cleat for fascia drip edge. Secure with fasteners as close to lower edge as possible on 75 mm (3 inch) centers.
4. Where ends of gravel stops and fascias abut a vertical wall, provide a watertight, flashed and sealant filled joint.
5. Set flange in roof cement when installed over built-up roofing.
6. Edge securement for low-slope roofs: Low-slope membrane roof systems metal edge securement, except gutters, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609, of IBC 2003.

B. Sheet metal gravel stops and fascia:

1. Install with end joints of splice plates sheets lapped three inches.
2. Hook the lower edge of fascia into a continuous edge strip.
3. Lock top section to bottom section for two piece fascia.

C. Corrugated sheet gravel stops and fascia:
   1. Install 300 mm (12 inch) wide sheet flashing centered under joint. A combination bottom and cover plate, extending above and beneath the joint, may be used.
   2. Hook lower edge of fascia into a continuous edge strip.

D. Scuppers:
   1. Install scupper with flange behind gravel stops; leave 6 mm (1/4 inch) joint to gravel stop.
   2. Set scupper at roof water line and fasten to wood blocking.
   3. Use sealant to seal joint with fascia gravel stops at ends.
   4. Coordinate to lap over conductor head and to discharge water into conductor head.

3.7 COPINGS

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

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

3.8 EXPANSION JOINT COVERS, INSULATED

A. Install insulated expansion joint covers at locations shown on curbs not less than 200 mm (8 inch) high above roof surface.

B. Install continuous edge strips of same metal as expansion joint flange, nailed at not less than 75 mm (3 inch) centers.

C. Install insulated expansion joint covers in accordance with manufacturer's directions locking edges to edge strips.

3.9 ENGINE EXHAUST PIPE OR STACK FLASHING

A. Set collar where shown and secure roof tabs or flange of collar to structural deck with 13 mm (1/2 inch) diameter bolts.

B. Set flange of sleeve base flashing not less than 100 mm (4 inch) beyond collar on all sides as specified for base flashing.

C. Install hood to above the top of the sleeve 50 mm (2 inch) and to extend from sleeve same distance as space between collar and sleeve beyond edge not sleeve:

1. Install insect screen to fit between bottom edge of hood and side of sleeve.
2. Set collar of hood in high temperature sealant and secure with one by 3 mm (1/8 inch) bolt on stainless steel draw band type, or stainless steel worm gear type clamp. Install sealant at top of head.

3.12 SPLASH PANS

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

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

3.13 GOOSENECK ROOF VENTILATORS

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

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

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

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SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies roof hatches; equipment supports; gravity ventilators.

1.2 RELATED WORK

A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

1.3 QUALITY CONTROL

A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.

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

C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples: Representative sample panel of color anodized aluminum not less than 100 mm X 100 mm (four by four inches), except extrusions shall be a width not less than section to be used. Sample shall show coating with integral color and texture and shall include manufacturer's identifying label.

C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

D. Manufacturer's Literature and Data: Each item specified.

E. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS

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

B. Federal Specifications (Fed. Spec.):

RR-G-1602D.....Grating, Metal, Other Than Bar Type (Floor, Except for Naval Vessels)

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

A653/A653M-08.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

B209/209M-07.....Aluminum and Aluminum Alloy-Sheet and Plate

B221/221M-08.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C612-04e1.....Mineral Fiber Block and Board Thermal Insulation

D1187-97 (2002)e1.....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

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

AMP 500 Series.....Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):

2605-05.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M.

B. Aluminum Sheet: ASTM B209/B209M.

C. Galvanized Sheet Steel: ASTM A526/A526M; G-90 coating.

D. Metal Grating for Roof Walkway: Fed. Spec. RR-G-1602.

2.2 ROOF HATCH (SCUTTLE)

A. Furnish and install where indicated on plans metal roof hatch Type S, size width: 3'0" (914mm) x length: 2'6" (762mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.

B. Performance characteristics:

1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span or a maximum design pressure of + or - 70 psf (342kg/m^2) with a factor of safety of 2.
2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the cover shall not be affected by temperature.
4. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.

C. Cover: Shall be 11 gauge aluminum with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. Cover insulation: Shall be fiberglass of 1" (25.4mm) thickness, fully covered and protected by a metal liner 18 gauge aluminum.

E. Curb: Shall be 12" (305mm) in height and of 11 gauge aluminum. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

F. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25.4mm) thickness on outside of curb.

G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

H. Hardware

1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25.4mm) diameter red vinyl grip handle to permit easy release for closing.
6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.

7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

I. Finishes: Factory finish shall be mill finish aluminum.

J. Models shall be Miami-Dade Product Control approved, meeting large and small missile impact requirements.

2.3 EQUIPMENT SUPPORTS

A. Fabricate equipment supports from 1.3 mm (0.0516 inch) thick galvanized steel.

B. Form exterior curb with integral base, and deck closures for curbs installed on steel decking.

C. Use galvanized steel liners for curbs having inside dimension over 305 mm (12 inches).

D. Fabricate curb with a minimum height of 200 mm (8 inches) above roof surface.

E. Attach preservative treated wood nailers to top of curb. Use 50 mm (2 inch) by 50 mm (2 inch) minimum nominal size on curb with openings and 50 mm (2 inch) thick, width of curb up to 300 mm (12 inches) on equipment support curbs.

F. Make size of supports suit size of equipment furnished, with height as shown on drawings, but not less than 200 mm (8 inches) above roof surface.

2.4 FINISH

A. In accordance with NAAMM Amp 500 Series.

B. Aluminum, Mill Finish: AA-MIX, as fabricated.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install roof specialties where shown.

B. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise.

C. Coordinate to install insulation where shown; see Section 07 21 13, THERMAL INSULATION and Section 07 22 00, ROOF AND DECK INSULATION.

D. Comply with section 07 92 00, JOINT SEALANTS to install sealants where manufactures installation instructions require sealant.

E. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
   a. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
   b. Install expansion joint cover with 6 mm (1/4 inch) wide space at end joints and tension bars at 600 mm (24 inches) on center.
   c. Install cover plates with formed aluminum flashing concealed and centered on joint. Flashing to lap cover not less than 100 mm (4 inches).

F. Equipment Supports: Do not anchor to insulating concrete or metal deck. Anchor only to building structure as per manufacturers recommendations.

3.2 PROTECTION OF ALUMINUM

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.

B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING

A. Adjust roof hatch hardware to operate freely and so that cover will operate without binding, close tightly at perimeter, and latch securely.

3.4 PROTECTION

Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies factory fabricated metal coping system, gravel stops, fascias, and expansion joints.

1.2 RELATED WORK

A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.

B. General insulation: Section 07 21 13, THERMAL INSULATION

C. Rough Carpentry: ROUGH CARPENTRY 06 10 00

D. SBS Modified Bitumen Roofing System: 07 52 16 SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

1.3 QUALITY CONTROL

A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.

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

C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples: Representative sample panel of color anodized aluminum not less than 100 mm X 100 mm (four by four inches), except extrusions shall be a width not less than section to be used. Sample shall show coating with integral color and texture and shall include manufacturer's identifying label.

C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

D. Manufacturer's Literature and Data: Each item specified.

E. Certificates: Stating that aluminum has been given specified thickness of anodizing.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society for Testing and Material (ASTM):

B209/209M-07.....Aluminum and Aluminum Alloy-Sheet and Plate

B221/221M-07.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C612-04e1.....Mineral Fiber Block and Board Thermal Insulation

D1187-97 (2002)e1.....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

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

AMP 500-505-88.....Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):

2605-05.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 – PRODUCTS

2.01. FACTORY FABRICATED METAL COPING SYSTEM: METAL COPING COMPONENTS SHALL BE FACTORY FABRICATED ACCORDING TO THE REQUIREMENTS OF THE ROOFING MEMBRANE MANUFACTURER AND EMBOSSED WITH THE ROOFING MANUFACTURER'S LOGO. THE METAL COPING SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- Factory formed anchor/cleat plates fabricated from 16 gauge, G90 galvanized steel.
- Factory formed gutter/splice plates fabricated from 0.032 inch aluminum with EPDM sealing gaskets.
- A factory formed coping cap fabricated from minimum 24 gauge galvanized steel 0.050 inch aluminum 0.063 inch aluminum 24 gauge stainless steel 22 gauge stainless steel having a mill coil coated Kynar™ finish to be selected from manufacturers standard colors.
- Factory formed welded miters and end caps.

2.02. FACTORY FABRICATED RAISED ROOF EDGE: FACTORY FABRICATED ROOF EDGE COMPONENTS SHALL BE FACTORY FORMED ACCORDING TO THE REQUIREMENTS OF THE MEMBRANE MANUFACTURER AND EMBOSSED WITH THE ROOFING MANUFACTURER'S LOGO. THE ROOF EDGE SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A factory formed cant dam with pre-punched nail holes, fabricated from 24 gauge, G90 galvanized steel, having a height of 2 inches above roof level, secured using galvanized roofing nails.
- A factory formed retainer cleat with pre-punched nail holes, fabricated from 20 gauge, G90 galvanized steel, secured using galvanized roofing nails.
- A factory formed exterior fascia, fabricated from minimum ***24 gauge*** galvanized steel 0.050 inch aluminum 0.063 inch aluminum 24 gauge

stainless steel 22 gauge stainless steel having a mill coil coated Kynar™ finish to be selected from manufacturers standard colors.

- Factory formed concealed splice plates.

- Factory formed welded miters and end caps.

- Factory formed leveling angles for accurate cant dam installation.

- Factory formed welded sump pans and spillout scuppers.

2.03. FACTORY FABRICATED GRAVEL STOP: FACTORY FABRICATED GRAVEL STOP COMPONENTS SHALL BE FACTORY FORMED ACCORDING TO THE REQUIREMENTS OF THE MEMBRANE MANUFACTURER AND EMBOSSED WITH THE ROOFING MANUFACTURER'S LOGO. THE GRAVEL STOP SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A factory formed retainer cleat with pre-punched nail holes fabricated from 24 gauge, G90 galvanized steel, secured using galvanized roofing nails.

- A factory formed gravel stop with pre-punched nailing holes, secured using galvanized roofing nails. fabricated from minimum 24 gauge galvanized steel 0.050 inch aluminum 0.063 inch aluminum 24 gauge stainless steel having a mill coil coated Kynar™ finish to be selected from manufacturers standard colors.

- Factory formed concealed splice plates.

- Factory formed welded miters.

2.04. FACTORY FABRICATED ROOF-TO-ROOF-EXPANSION JOINT: FACTORY FABRICATED ROOF-TO-ROOF EXPANSION JOINT COMPONENTS SHALL BE FACTORY FORMED ACCORDING TO THE REQUIREMENTS OF THE MEMBRANE MANUFACTURER AND EMBOSSED WITH THE ROOFING MANUFACTURER'S LOGO. THE ROOF-TO-ROOF EXPANSION JOINT SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A factory formed cap fabricated from minimum 24 gauge galvanized steel 0.050 inch aluminum 0.063 inch aluminum 24 gauge stainless steel 22 gauge stainless steel having a mill coil coated Kynar™ finish to be selected from manufacturers standard colors.

- A factory formed traveler cleat fabricated from 20 gauge, G90 galvanized steel.

  Specially designed shouldered cleat fasteners to allow for traveler cleat movement.

- Factory formed gutter/splice plates fabricated from 0.040 inch aluminum with EPDM sealing gaskets.

- Factory formed curb rails fabricated from 24 gauge, G90 galvanized steel.

- A flexible membrane vapor retarder / insulation retainer.

- Factory formed welded miters, end caps, tees, and crosses.

2.05. FACTORY FABRICATED ROOF-TO-WALL EXPANSION JOINT: FACTORY FABRICATED ROOF-TO-WALL EXPANSION JOINT COMPONENTS SHALL BE FACTORY FORMED ACCORDING TO THE REQUIREMENTS OF THE MEMBRANE MANUFACTURER AND EMBOSSED WITH THE ROOFING MANUFACTURER'S LOGO. THE ROOF-TO-WALL EXPANSION JOINT SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A factory formed cap fabricated from minimum 24 gauge galvanized steel 0.050 inch aluminum 0.063 inch aluminum 24 gauge stainless steel 22 gauge stainless steel having a mill coil coated Kynar™ finish to be selected from manufacturers standard colors.

- A factory formed traveler cleat fabricated from 20 gauge, G90 galvanized steel.

- Specially designed shouldered cleat fasteners to allow for traveler cleat movement.

- Factory formed gutter/splice plates fabricated from 0.040 inch aluminum with EPDM sealing gaskets.

- Factory formed curb rail fabricated from 24 gauge, G90 galvanized steel.

- A flexible membrane vapor retarder / insulation retainer.

- Factory formed welded miters and end caps.

PART 3 – EXECUTION

3.01. FACTORY FABRICATED METAL COPING INSTALLATION.

A. Set anchor cleats at corners and/or ends. Position all cleats in strict accordance with the factory coping system manufacturer's installation instructions and code approval requirements, pulling each cleat snugly against the exterior face of the building.

B. Place corner support clips at all corners to support the cap. Set the coping system manufacturer's support clip away from the corner approximately 1/2 inch and fasten in accordance with the coping system manufacturer's installation instructions.

C. Install guttered splices centered on the anchor cleats with drip edge portion on the outside of the cleat.

D. Beginning again at the corners and/or ends, hook the outside leg of the coping cap over the outside face of the cleats first. Rotate the cap over the top of the wall pressing lightly, but firmly, on the top of the cap until the inside leg fully locks over the roof side of the anchor cleats. Allow a 1/8 inch gap between coping

sections for thermal movement. Increase the gap to 1/4 inch when installing in temperatures below 40°F.

E. Isolate continuous runs of coping into manageable zones to control thermal movement by securing every fifth section of coping cap to an anchor cleat in accordance with the coping system manufacturer's installation instructions.

3.02. FACTORY FABRICATED RAISED ROOF EDGE

A. Beginning at the corners, install the factory fabricated cant dam over the base ply of roof membrane, securing it to the perimeter nailer in accordance with the raised roof edge system manufacturer's installation instructions.

B. After completion of the installation of the roofing/***waterproofing*** flashing membrane plies over the cant dam, Place the retainer cleat over the finished flashing membrane firmly, without forcing. The retainer cleat shall be level and the nailing slots shall align centered with the nailer underneath the membrane/cant dam assembly. Fasten the retaining cleat in accordance with the raised roof edge system manufacturer's installation instructions.

C. Beginning again at the corners, install the exterior fascia by setting it onto the retainer cleat and firmly pushing down until the fascia snaps over the front and back of the retainer cleat. Slide a concealed joint splice plate halfway into the fascia to allow the next section to fit halfway over the joint splice plate as well. Allow a 1/8 inch gap between raised roof edge sections for thermal movement. Increase the gap to 1/4 inch when installing in temperature below 40°F.

3.03. FACTORY FABRICATED GRAVEL STOP

A. Place the continuous retainer cleat to the roofing/***waterproofing*** surface firmly against the perimeter nailer. The retainer cleat should be level and the nailing slots should align centered with the nailer underneath. Fasten the retaining cleat in accordance with the gravel stop system manufacturer's installation instructions.

B. Starting at the corners, trowel a bead of the roofing/***waterproofing*** manufacturer's specified mastic over the base ply of membrane where the flange of the exterior fascia is to be set. Hook the drip edge of the exterior fascia over the retainer cleat and fasten the flange through the pre-punched holes in accordance with the gravel stop system manufacturer's installation instructions. Slide a concealed joint splice plate halfway into the fascia to allow the next section to fit halfway over the joint splice plate as well. Allow a 1/8 inch gap between gravel stop sections for thermal movement. Increase the gap to 1/4 inch when installing in temperature below 40°F.

C. After installation of the factory fabricated gravel stop is complete, ensure that the roofing/***waterproofing*** stripping and finish

plies are installed in accordance with the roofing/***waterproofing*** membrane manufacturer's specifications and details.

3.04. FACTORY FABRICATED ROOF TO ROOF EXPANSION JOINT

A. Fasten the curb rails to the previously flashed curbs using roofing nails every 24 inches on center.

B. Place the traveler cleat over the curb rails, allowing the horizontal slots to center over the rail. Secure the traveler cleat in accordance with the expansion joint system manufacturer's installation instructions.

C. Guttered splice plates are placed over the traveler cleat on 5 foot centers, ensuring that a splice plate is placed centered where there will be a joint in the cap sections. Set each guttered splice plate in a 1 inch dollop of the roofing/***waterproofing*** manufacturer's specified elastomeric sealant.

D. Hook the bottom edge of the cap face of one side securely on the drip edge of the traveler cleat. While maintaining engagement, rotate the cap length over the cleat and press the cap firmly downward on the back edge above the traveler cleat until it locks onto the cleat. Allow a 1/8 inch gap between expansion joint sections for thermal movement. Increase the gap to 1/4 inch when installing in temperature below 40°F.

E. Isolate continuous runs of expansion joint into manageable zones to control thermal movement by securing every fifth section of expansion joint cap to the traveler cleat in accordance with the expansion joint system manufacturer's installation instructions.

3.05. FACTORY FABRICATED ROOF TO WALL EXPANSION JOINT

A. Fasten the curb rail to the previously flashed curb using roofing nails spaced 24 inches on center.

B. Fasten the wall rail to the wall using fasteners approved for use with the wall substrate every 24 inches on center.

C. Place the traveler cleat over the curb rail, allowing the horizontal slots to center over the rail. Secure the traveler cleat through the slots using the drill point screws and extruded washers to the curb first and then to the wall centered over the installed rails.

D. Place guttered splice plates over the traveler cleat on 5 foot centers, ensuring that a splice plate is placed centered where there will be a joint in the cap sections. Set each guttered splice plate in a 1 inch dollop of the roofing/waterproofing manufacturer's specified elastomeric sealant.

E. Hook the bottom edge of the cap face securely on the drip edge of the traveler cleat. While maintaining engagement, rotate the cap length over the cleat positioning the top leg of the cap firmly against the wall. Fasten the top leg of the cap to the wall using

fasteners approved for use with the wall substrate at 12 inches on center. Flash or seal the top leg of the expansion joint cap in accordance with the roofing/waterproofing membrane manufacturer's specifications and details. Allow a 1/8 inch gap between expansion joint sections for thermal movement. Increase the gap to 1/4 inch when installing in temperature below 40°F.

F. Isolate continuous runs of expansion joint into manageable zones to control thermal movement by securing every fifth section of expansion joint cap to the traveler cleat in accordance with the expansion joint system manufacturer's installation instructions.

3.2 PROTECTION OF ALUMINUM

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on side.

B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two coats of asphalt coating.

3.3 ADJUSTING

Adjust expansion joints to close tightly and be watertight; insuring maximum allowance for building movement.

3.4 PROTECTION

Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

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SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies cementitious fireproofing to all new structural steel members

B. This section specifies cementitious fireproofing to any existing interior structural steel members that have existing fireproofing damaged or removed by construction.

C. The replacement fireproofing shall have the same fire rating as existing where patching occurs.

D. Coordinate with Asbestos Abatement process.

E. Coordinate with VA Contracting Officer for schedule of work to not effecting existing operation.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

C. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

D. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and certification of compliance with the specified requirements.

B. Remove damaged containers from the site.

C. Store the materials off the ground, under cover, away from damp surfaces.

D. Keep dry until ready for use.

E. Remove materials that have been exposed to water before installation from the site.

1.4 QUALITY CONTROL

A. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

B. Manufacturer's inspection and approval of surfaces to receive fireproofing as specified under paragraph Examination.

C. Manufacturer's approval of fireproofing applications.

D. Manufacturer's approval of completed installation.

E. Manufacturer's representative shall observe and advise at the commencement of application, and shall visit the site as required thereafter for the purpose of ascertaining proper application.

F. Pre-Application Test Area.

1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
   a. Apply to one column.
   b. Apply for the hourly ratings used.
2. Install in location selected by the Resident Engineer, for approval by the representative of the fireproofing material manufacturer and by the Government.
3. Perform Bond test on painted steel in accordance with ASTM E736.
4. Do not proceed in other areas until installation of test area has been completed and approved.
5. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

1.5 APPLICABLE PUBLICATIONS

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

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

C841-03 (2008)e1.....Installation of Interior Lathing and Furring

C847-06.....Metal Lath

E84-08a.....Surface Burning Characteristics of Building Materials

E119-08a.....Fire Tests of Building Construction and Materials

E605-93 (2006).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members

E736-00 (2006).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92 (2005).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92 (2005).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92 (2005).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93 (2006).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93 (2005).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

E1042-02 (2008).....Acoustically, Absorptive Materials Applied by Trowel or Spray.

G21-96 (R2002).....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):

Certification Listings..Latest Edition

E. Factory Mutual System (FM):

Approval Guide.....Latest Edition including Supplements

PART 2 – PRODUCTS

2.1 SPRAYED-ON FIREPROOFING

A. ASTM E1042, Class (a), Category A.

1. Type I, factory mixed cementitious materials with approved aggregate, minimum 240 kg/m^3 (15 1b/ft^3) density per ASTM E605 test unless specified otherwise.

B. Materials containing asbestos are not permitted.

C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3m (10 ft.)
2.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.
3.	Bond Impact	ASTM E760	No cracking, spalling, or delamination.
4.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 9.57 kPa (200 lbf/ft^2) for protected areas. 19.15 kPa (400 lbf/ft^2) for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27gm/m^2 (0.025 gm/ft^2).
6.	Compressive Strength	ASTM E761	Minimum compressive strength 36 kPa (5 lbf/in^2).
7.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 25 or less smoke developed 50 or less
8.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

2.2 ADHESIVE

A. Bonding adhesive for Type I materials as recommended and supplied by the fireproofing material manufacturer for primed steel locations.

B. Adhesive must be applied separately to surface receiving fireproofing material as required.

2.3 WATER

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.4 MECHANICAL BOND MATERIAL

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg/m^2 (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

2.5 FIREPROOFING SCHEDULE

Required fire resistance rating: table 601 IBC Codes 2009

- **Primary structural frame: 3 hrs**
- **Primary structural frame, supporting roof: 2 hrs**
- **Floor construction + secondary structural members: 2 hrs**
- **Roof construction + secondary structural members: 1 1/2hrs**

Floor Assembly shall meet UL design No. D925, 2 hrs, Restrained.

Roof Assembly shall meet UL Design No. P936, 1-1/2 hrs, Restrained.

Wide Flange Columns shall meet UL Design No. Y715, 3 hrs

Tube Columns shall meet UL Design No. Y710, 3 hrs

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. Verify temperature and enclosure conditions are required by fire-proofing material manufacturer.

3.2 APPLICATION

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Application of Metal Lath:
   1. Apply to beam and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
   2. Apply to beam flanges 300 mm (12-inches) or more in width.
   3. Apply to column flanges 400 mm (16-inches) or more in width.
   4. Apply to beam or column web 400 mm (16-inches) or more in depth.
   5. Tack weld or mechanically fasten on maximum of 300 mm (12-inch) center.
   6. See design criteria section of the approved assemblies used.
   7. Lap and tie lath member in accordance with ASTM C841.

D. Mix and apply in accordance with manufacturer's instructions.
   1. Mechanically control material and water ratios.
   2. Apply adhesive and sealer, when required, in accordance with the manufacturer's instructions.
   3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
   4. Minimum applied dry density per cubic meter (cubic foot) for the underside of the walk on deck (interstitial) hung purl in or beam and steel deck, columns in interstitial spaces and mechanical equipment rooms shall be as follows:
      a. Type I - 240 kg/m^3 (15 lb/ft^3): exposed condition.

E. Application shall be completed in one area, inspected and approved by Resident Engineer before removal of application equipment and proceeding with further work.

F. After the installation, he applies a tinted sealer over the new fireproofing with the tinting to be dark enough to be easily seen. Refer to existing similar application in the same facility.

3.3 FIELD TESTS

A. Tests of applied material will be performed by VA retained Testing Laboratory. See Section 01 45 29, TESTING LABORATORY SERVICES.

B. Resident Engineer will select area to be tested in specific bays on each floor using a geometric grid pattern.

C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test will be rejected.

D. Areas showing less than required fireproofing characteristics will be rejected on the following field tests.
   1. Test for cohesion/adhesion: ASTM E736.
   2. Test for bond impact strength: ASTM E760.

E. Show proof that new work covers all the same elements and area as the existing.

3.3 PATCHING AND REPAIRING

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.
   1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
   2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
   3. Hand mixing of material is not permitted.

C. Repair:
   1. Respray all test and rejected areas.
   2. Patch fireproofing material which is removed or disturbed after approval.

D. Perform final inspection of sprayed areas after patching and repair.

3.5 SCHEDULE

A. Apply fireproofing material in interior structural steel members to give the same fire protection as the existing application.

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SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.1 DESCRIPTION

A. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.

B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK

A. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

B. 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. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

C. List of FM, UL, or WH classification number of systems installed.

D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

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 WARRANTY

Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

1.6 QUALITY ASSURANCE

FM, UL, or WH or other approved laboratory tested products will be acceptable.

1.7 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 Society for Testing and Materials (ASTM):
E84-08a.....Surface Burning Characteristics of Building Materials
E814-08b.....Fire Tests of Through-Penetration Fire Stops

C. Factory Mutual Engineering and Research Corporation (FM):
Annual Issue Approval Guide Building Materials

D. Underwriters Laboratories, Inc. (UL):
Annual Issue Building Materials Directory
Annual Issue Fire Resistance Directory
1479-03.....Fire Tests of Through-Penetration Firestops

E. Warnock Hersey (WH):
Annual Issue Certification Listings

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS

A. Use 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.

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 100 mm (4 in) nominal pipe or 0.01 m^2 (16 sq. in.) in overall cross sectional area.

C. Products requiring heat activation to seal an opening by its intumescence shall exhibit a demonstrated ability to function as designed to maintain the fire barrier.

D. Firestop sealants used for firestopping or smoke sealing shall have following properties:
   1. Contain no flammable or toxic solvents.
   2. Have 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 used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:
   1. Classified for use with the particular type of penetrating material used.
   2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
   3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.
F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.
G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
H. Materials to be asbestos free.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS

A. Use silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
B. Use mineral fiber filler and bond breaker behind sealant.
C. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with 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

Submit product data and installation instructions, as required by article, submittals, after an on site examination of areas to receive firestopping.

3.2 PREPARATION

A. Remove dirt, grease, oil, 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 (six inches) on either 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.

3.3 INSTALLATION

A. Do not begin 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 AND ACCEPTANCE OF WORK

A. As work on each floor is completed, remove materials, litter, and debris.

B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.

C. Clean up spills of liquid type materials.

- - - E N D - - -

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK:

A. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.

B. Lead Glass: Section 13 49 00, RADIATION PROTECTION.

C. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.

G. 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 CONTROL:

A. Installer Qualifications: An experienced installer 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.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:

1. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.

b. Each type of non-elastomeric sealant and joint substrate indicated.

2. Notify Resident Engineer seven days in advance of dates and times when test joints will be erected.

E. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this section.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color where required to match adjacent material.

D. Manufacturer's Literature and Data:

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

1.5 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 °C (40 °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.

1.6 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 5° C (40° F) or less than 32° C (90° F).

1.7 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Back-up 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.

1.8 WARRANTY:

A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

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 Society for Testing and Materials (ASTM):

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.

C612-04e1.....Mineral Fiber Block and Board Thermal Insulation.

C717-08.....Standard Terminology of Building Seals and Sealants.

C834-05.....Latex Sealants.

C919-08.....Use of Sealants in Acoustical Applications.

C920-08.....Elastomeric Joint Sealants.

C1021-08.....Laboratories Engaged in Testing of Building Sealants.

C1193-05a.....Standard Guide for Use of Joint Sealants.

C1330-02 (2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-08a.....Surface Burning Characteristics of Building Materials.

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

PART 2 - PRODUCTS

2.1 SEALANTS:

A. S-1:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-3:
1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-25.
6. Minimum elongation of 700 percent.

D. S-4:
1. ASTM C920 polyurethane or polysulfide.
2. Type S.
3. Class 25.

4. Grade NS.
5. Shore A hardness of 25-40.

E. S-5:
1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade P.
5. Shore hardness of 15-45.

F. S-6:
1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

G. S-7:
1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

H. S-8:
1. ASTM C920, silicone, acetoxy cure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

I. S-9:
1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

J. S-10:

1. ASTMC C920, coal tar extended fuel resistance polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 15-20.

K. S-11:

1. ASTM C920 polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

L. S-12:

1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

2.2 CAULKING COMPOUND:

A. C-1: ASTM C834, acrylic latex.

B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

A. Sealants used with exposed masonry shall match color of mortar joints.

B. Sealants used with unpainted concrete shall match color of adjacent concrete.

C. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.

D. Caulking shall be light gray or white, unless specified otherwise.

2.4 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, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° 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.

2.5 FILLER:

A. Mineral fiber board: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.7 CLEANERS-NON POUROUS SURFACES:

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, 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.

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 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.
   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

C. Do not cut or damage joint edges.

D. Apply 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.
   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.

F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION:

A. Install back-up 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 back-up rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.

D. Install back-up 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 back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

F. Take all necessary steps to prevent three sided adhesion of sealants.

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° C and 38° C (40° and 100° F).
2. Do not use 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 use 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 joints to concave surface unless shown or specified otherwise.
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.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

C. 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 cut-outs 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 as recommended by sealant manufacturer:
   1. Extent of Testing: Test completed elastomeric sealant joints as follows:
      a. Perform 10 tests for first 300 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
      b. Perform one test for each 300 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. 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 the caulking or sealant manufacturer.

B. After filling and finishing joints, remove masking tape.

C. Leave adjacent surfaces in a clean and unstained condition.

3.8 LOCATIONS:

A. Exterior Building Joints, Horizontal and Vertical:

1. Metal to Metal: Type S-1, S-2
2. Metal to Masonry or Stone: Type S-1
3. Masonry to Masonry or Stone: Type S-1
4. Stone to Stone: Type S-1
5. Cast Stone to Cast Stone: Type S-1
6. Threshold Setting Bed: Type S-1, S-3, S-4
7. Masonry Expansion and Control Joints: Type S-6
8. Wood to Masonry: Type S-1

B. Metal Reglets and Flashings:

1. Flashings to Wall: Type S-6
2. Metal to Metal: Type S-6

C. Sanitary Joints:

1. Walls to Plumbing Fixtures: Type S-9
2. Counter Tops to Walls: Type S-9
3. Pipe Penetrations: Type S-9

D. Horizontal Traffic Joints:

1. Concrete Paving, Unit Pavers: Type S-11 or S-12
2. Garage/Parking Decks: Type S-10

E. High Temperature Joints over 204 degrees C (400 degrees F):

1. Exhaust Pipes, Flues, Breech Stacks: Type S-7 or S-8

F. Interior Caulking:

1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1, C-2 and C-3.
2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1, C-2 and C-3.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1, C-2 and C-3.
4. Perimeter of Lead Faced Control Windows and Plaster or Gypsum Wallboard Walls: Types C-1, C-2 and C-3.

5. Exposed Isolation Joints at Top of Full Height Walls: Types C-1, C-2 and C-3.
6. Exposed Acoustical Joint at Sound Rated Partitions Type C-2.
7. Concealed Acoustic Sealant Type S-4, C-1, C-2 and C-3.

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SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies floor, wall and ceiling and building expansion joint assemblies.

B. Types of assemblies:
   Metal Plate Cover
   Elastomeric Joint Covers
   Preformed Elastomeric Sealant Joint

C. Provide interior and exterior expansion joint cover assemblies.

D. Refer to drawings for locations and types.

1.2 RELATED WORK

A. Sheet Metal Expansion Joint Seals: Section 07 60 00, FLASHING AND SHEET METAL.

B. Steel Plate Expansion Joint Covers: Section 05 50 00, METAL FABRICATIONS.

1.3 QUALITY ASSURANCE

A. Project Conditions:
   1. Check actual locations of walls and other construction, to which work must fit, by accurate field measurements before fabrication.
   2. Show recorded measurements on final shop drawings.

B. Fire tests performed by Factory Mutual, Underwriters Laboratories, Inc., Warnock Hersey or other approved independent testing laboratory.

1.4 DELIVERY STORAGE AND HANDLING

A. Take care in handling of materials so as not to injure finished surface and components.

B. Store materials under cover in a dry and clean location off the ground.

C. Remove materials which are damaged or otherwise not suitable for installation from job site and replace with acceptable materials.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:
   1. Submit copies of manufacturer's current literature and data for each item specified.

2. Clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for ultraviolet exposure.

C. Certificates: Material test reports from approved independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements specified.

D. Shop Drawings:

1. Showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joiners with other type assemblies, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes.
2. Include description of materials and finishes and installation instructions.

E. Samples:

1. Samples of each type and color of metal finish on metal of same thickness and alloy used in work.
2. Samples of each type and color of flexible seal used in work.

1.6 APPLICABLE PUBLICATIONS

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

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

A36/A36M-08.....Structural Steel
A167-99 (2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A283/A283M-03 (2007)....Low and Intermediate Tensile Strength Carbon Steel Plates
A786/A786M-05.....Rolled Steel Floor Plates
B36/B36M-08a.....Brass, Plate, Sheet, Strip, and Rolled Bar
B121-01(2006).....Leaded Brass Plate, Sheet, Strip and Rolled Bar
B209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
B221M-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

B455-05.....Copper-Zinc Lead Alloy (Leaded Brass) Extruded Shapes

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-08.....Elastomeric Joint Sealants

D1187-97 (2002)e1.....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D2287-96 (2001).....Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

E119-08a.....Fire Tests of Building Construction and Materials

E814-08b.....Fire Tests of Through-Penetration Fire Stops

C. Federal Specifications (Fed. Spec):

TT-P-645B.....Primer, Paint, Zinc-Molybdate, Alkyd Type

D. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual.

E. National Fire Protection Association (NFPA):

251-2006.....Tests of Fire Endurance of Building Construction and Materials

F. Underwriters Laboratories Inc. (UL):

263-03.....Fire Tests of Building Construction and Materials

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5.
2. Plate and Sheet: ASTM B209, alloy 6061-T6.

B. Elastomeric Sealant:

1. ASTM C920, polyurethane.
2. Type.
3. Class 25.
4. Grade P or NS.
5. Shore A hardness 25, unless specified otherwise.

C. Thermoplastic Rubber:

1. ASTM C864.
2. Dense Neoprene or other material standard with expansion joint manufacturers having the same physical properties.

D. Fire Barrier:
   1. Designed for indicated or required dynamic structural movement without material degradation or fatigue.
   2. Tested in maximum joint width condition as a component of an expansion joint cover assembly in accordance with UL 263 NFPA 251, or ASTM E119 and E814, including hose steam test at full-rated period.

E. Accessories:
   1. Manufacturer's standard anchors, fasteners, set screws, spaces, flexible secondary water stops or seals and filler materials, drain tubes, adhesive and other accessories as indicated or required for complete installations.
   2. Compatible with materials in contact.
   3. Water stops.

2.2 FABRICATION

A. General:
   1. Use ceiling and wall expansion joint cover assemblies of same design as floor to wall and floor to floor expansion joint cover assemblies. Unless shown otherwise.
   2. Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
   3. Deliver to job site ready for use and fabricated in as large sections and assemblies as practical. Assemblies identical to submitted and reviewed shop drawings, samples and certificates.
   4. Furnish units in longest practicable lengths to minimize number of end joints. Provide mitered corners where joint changes directions or abuts other materials.
   5. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
   6. Fire Performance Characteristics:
      a. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.

b. Fire rating: Not less than rating of adjacent floor or wall construction.

7. Seal Strip factory - formed and bonded to metal frames and anchor members.
8. Compression Seals: Prefabricate from thermoplastic rubber or dense neoprene to sizes and approximate profiles shown.

B. Floor-to-Floor Metal Plate Joints:
1. Frames on each side of joint designed to support cover plate of design shown.
   a. Continuous frame designed to finish flush with adjacent floor of profile indicated with seating surface and raised floor rim to accommodate flooring.
   b. Provide concealed bolt and steel anchors for embedment in concrete.
   c. Designed for filler materials between raised rim of frame and edge of cover plate where shown.
   d. Frame and cover plates of some metal where exposed.
      1) Design cover plates to support 180 Kg (400 lbs) per 0.3 square meters (1-square foot).
      2) Cover plates free of rattle due to traffic.
      3) No gaps or budges occur on filler material during design movement of joint.
      4) Provide manufacturer's continuous standard flexible vinyl water stop under floor joint cover assemblies.

C. Floor-to-Wall Metal Plate Joints:
1. Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.
2. Angle Cover Plates: Provide angle cover plates for joints to wall with countersunk flat-head exposed fasteners for securing to wall unless shown otherwise.
3. Space fasteners as recommended by manufacturer.
4. Match cover of adjacent floor to floor cover.

D. Interior Wall Joint Cover Assemblies:
1. Surface Mounted Metal Cover Plates:
   a. Concealed frame for fastening to wall on one sides of joint.

b. Extend cover to lap each side of joint and to permit free movement on one side.
c. Provide concealed attachment of cover t frame cover in close contact with adjacent finish wall surfaces.
d. Use angle cover plates at intersection of walls.
e. Use smooth surface cover plates matching floor plates.
f. Use expansion fire inserts in fire rated walls, rated same as hour rating of wall.

E. Exterior Wall Joint Assemblies:
1. Variable movement with seal designed to prevent water and air infiltration.
2. Use vinyl seal strip as secondary seal behind primary seal.
3. Cover Plate Assemblies:
a. Surface mounted cover plate.
b. Concealed frame for fastening to wall on one side of joint.
c. Extend cover to lap each side of joint and to permit free movement on one side.
d. Provide concealed attachment of cover to frame for cover with cover in close contact with adjacent finish surfaces.
e. Use angle cover plate of intersection of walls.
4. Extruded thermoplastic rubber joint assemblies.
a. Aluminum frames both sides of joint.
1) Designed to receive flexible rubber primary seal on exposed face after installation of frame.
2) Designed to receive continuous secondary vinyl sheet seal.
3) Anchor spaced at ends and not over 600 mm (24-inches).
b. Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint. Refer to Structural for design movement requirement.
c. Provide factory heat welded transitions where directional changes occur to ensure a watertight system.
d. Provide pantographic wind load supports, maximum 2400 mm (8 feet) on center to support seal systems of 300 mm (12-inches) and wider.

F. Ceiling and Soffit Assemblies:
1. Variable movement vinyl insert in metal frame on both sides of joint.

2. Designed for flush mounting with no exposed fasteners.
3. Vinyl insert locked into metal frame.
5. Vinyl insert semi rigid either flush face or accordion shape as showed to span joint width without sagging.

G. Preformed Sealant Joint: Factory installed elastomeric sealant between extruded aluminum angle frame both sides.
1. Elastomeric Sealant: Two part polyurethane sealant with movement capability of +/- 25% of joint width per ASTM-C-920, Type M, Grade P, Class 25, Shore A hardness of 25+/-5.
   a. Color: to be selected by VA Project manager.
2. Frame: Extruded Aluminum: finish to match existing.
3. Anticipated movement: Refer to Structural.

2.3 METAL FINISHES

A. General:
1. Apply finishes in factory after products are fabricated.
2. Protect finishes on exposed surfaces with protective covering before shipment.

B. Aluminum Finishes:
1. Finish letters and numbers for anodized aluminum are in accordance with the NAAMM AMP 501, Aluminum Association's Designation System).
   a. Clear anodized finish: AA-C22A41 Chemically etched medium matte, clear anodic coating, Class I Architectural, 0.7 - mil thick.

      SPEC WRITER NOTE: Use of colored coatings on floor covers is not recommended.

   b. Color anodized finish: AA-C22A42, Chemically etched medium matte, integrally colored anodic coating, Class I Architectural, 0.7-mil thick; or AA-C22A44 Chemically etched medium matte, electrolytically deposited metallic compound, Class I Architectural, 0.7-mil thick finish. Dyes not accepted.
3. Factory-Primed Concealed Surface: NAAMM AMP 505 Protect concealed aluminum surfaces that will be in contact with plaster, concrete or masonry surfaces when installed by applying a shop coat of zinc-molybdate primer to contact surfaces. Provide minimum dry film thickness of 2.0 mils.

PART 3 EXECUTION

3.1 EXAMINATION

A. Manufacturer's representative shall make a thorough examination of surfaces receiving work of this section.

B. Before starting installation, notify prime contractor of defects which would affect satisfactory completion of work.

3.2 PREPARATION

A. Verify measurements and dimensions at job site and cooperate in coordination and scheduling of work with work of related trades.

B. Give particular attention to installation of items embedded in concrete and masonry so as not to delay job progress.

C. Provide templates to related trade for location of support and anchorage items.

3.3 INSTALLATION

A. Install in accordance with manufacturers installation instructions unless specified otherwise.

B. Provide anchorage devices and fasteners for securing expansion joint assemblies to in-place construction including threaded fasteners with drilled-in fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide metal fasteners of type and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.

D. Install joint cover assemblies in true alignment and proper relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.

E. Allow for thermal expansion and contraction of metal to avoid buckling.

F. Set floor covers at elevations flush with adjacent finished floor materials unless shown otherwise.

G. Material and method of grouting floor frames set in prepared recesses in accordance with manufacturer's instructions.

H. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.

I. Locate anchors at interval recommended by manufacturer, but not less than 75 mm (3-inches) from each ends, and, not more than 600 mm (24-inches) on centers.

J. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.

K. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames or plates.

L. Flush Metal Cover Plates:
   1. Secure flexible filler between frames so that it will compress and expand.
   2. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

M. Waterstops:
   1. Install in conjunction with floor joints and where shown, run continuously to prevent water damage to finish spaces.
   2. Provide seal with frame to prevent water leakage.
   3. Provide outlet tubes from waterstops to drain to prevent damage to finish spaces.

N. Fire Barriers:
   1. Install in compliance with tested assembly.
   2. Install in floors and in fire rated walls.
   3. Use fire barrier sealant or caulk supplied with system.

O. Sealants:
   Install to prevent water and air infiltration.

P. 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 independent continuous PVC back seal.
   2. Install primary seals retained in extruded aluminum side frames.

Q. Installation of Extruded Thermoplastic Rubber or Seals:
   1. For straight sections, provide preformed seals in continuous lengths.
   2. Vulcanize or heat-seal field splice joints to provide watertight joints using manufacturer's recommended procedures.

R. Installation of Preformed Elastomeric Sealant Joint:
   1. Locate joint directly over joints in wall or floor substrates.
   2. Full length shall be fastened to substrate using a construction adhesive.

3. Install flush or slightly below finish material.

3.4 PROTECTION

A. Take proper precautions to protect the expansion joint covers from damage after they are in place.

B. Cover floor joints with plywood where wheel traffic occurs.

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SECTION 08 11 13
HOLLOW METAL DOOR FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel frames and related components.

B. Terms relating to steel frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

A. Section 08 14 00, INTERIOR WOOD DOORS

B. Door Hardware: Section 08 71 00, DOOR HARDWARE.

C. Lead Lined Door Frames: Section 13 49 00, RADIATION PROTECTION

1.3 TESTING

An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers Literature and Data

1.5 SHIPMENT

A. Prior to shipment label each frame to show location, size, door swing and other pertinent information.

B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

A. Store frames at the site under cover.

B. Protect from rust and damage during storage and erection until completion.

1.7 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. Federal Specifications (Fed. Spec.):

L-S-125B.....Screening, Insect, Nonmetallic

C. Door and Hardware Institute (DHI):

A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

D. Steel Door Institute (SDI):

113.....Apparent Thermal Performance for Steel Door and Frame Assemblies

114.....Acoustical Performance for Steel Door and Frame Assemblies

A250.8-03.....Standard Steel Doors and Frames

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

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A568/A568M-07a.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled

A1008-08a.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability

B209/209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221/221M-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

D1621-04a.....Compressive Properties of Rigid Cellular Plastics

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

F. The National Association Architectural Metal Manufactures (NAAMM):

Metal Finishes Manual (1988 Edition)

G. National Fire Protection Association (NFPA):

80-08.....Fire Doors and Fire Windows

H. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

I. Intertek Testing Services (ITS):

Certifications Listings…Latest Edition

J. Factory Mutual System (FM):

Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A167, Type 302 or 304; finish, NAAMM Number 4.

B. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

C. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

D. Aluminum Sheet: ASTM B209/209M.

E. Aluminum, Extruded: ASTM B221/221M.

F. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. General:

1. SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
2. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:

1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Provide mortar guards securely fastened to back of hardware reinforcements except on lead-lined frames.
3. Where concealed door closers are installed within the head of the door frames, prepare frames for closers and provide 1 mm (0.042 inch) thick steel removable stop sections for access to concealed face plates and control valves, except when cover plates are furnished with closer.

C. Terminated Stops: SDI A250.8.

D. Glazed Openings and Panel Opening:

a. Integral stop on exterior, corridor, or secure side of door.
b. Design rabbet width and depth to receive glazing material or panel shown or specified.

E. Two piece frames:

a. One piece unequal leg finished rough buck sub-frames as shown, drilled for anchor bolts.
b. Unequal leg finished frames formed to fit subframes and secured to subframe legs with countersunk, flat head screws, spaced 300 mm (12 inches) on center at head and jambs on each side.
c. Preassemble at factory for alignment.

F. Frame Anchors:

1. Floor anchors:

a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts. Use 50 mm x 50 mm (2 inch by 2 inch) 9 mm by (3/8 inch) clip angle for lead lined frames, drilled for 9 mm (3/8 inch) floor bolts.
c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.
d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (2 inches) on center.

2. Jamb anchors:

a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for

fire rated frames space anchors as required by labeling authority.

b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.

c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:

1) Wire loop type of 5 mm (3/16 inch) diameter wire.

2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.

d. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.

e. Anchors for frames set in prepared openings:

1) Steel pipe spacers with 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.

2) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass thru frame and spacers.

3) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.

f. Anchors for observation windows and other continuous frames set in stud partitions.

1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.

2) Anchors spaced 600 mm (24 inches) on centers maximum.

g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.3 SHOP PAINTING

SDI A250.8.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Plumb, align and brace frames securely 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 if the shipping spreader is removed.

3. Protect frame from accidental abuse.

4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.

5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

B. Floor Anchors:

1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts. Use 9 mm (3/8 inch) bolts on lead lined frames.

2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:

1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.

2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.

3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.

4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

D. Install anchors for labeled fire rated doors to provide rating as required.

E. Frames for Sound Rated Doors: Coordinate to line frames for sound rated doors with insulation.

F. Overhead Bracing (Lead Lined Frames): Where jamb extensions extend to structure above, anchor clip angles with not less than two, 9 mm (3/8 inch) expansion bolts or power actuated drive pins to concrete slab. Weld to steel overhead members.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

Install door frame hardware as specified in Sections: Section 08 11 13, HOLLOW METAL FRAMES; Section 08 14 00, WOOD DOORS, Section 08 71 00 DOOR HARDWARE, Section 13 49 00, RADIATION PROTECTION.

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SECTION 08 11 74
AUTOMATIC SLIDING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Automatic sliding doors with operator and motion/presence sensor control device.

1.2 RELATED SECTIONS

A. Section 08410 - Aluminum-Framed Storefronts.
B. Section 08700 - Hardware.
C. Section 08800 - Glazing.
D. Section 16000 - Electrical.

1.3 REFERENCES

A. ANSI Z97.1 - Safety Glazing Material Used in Buildings.
B. ANSI/BHMA 156.10 - Power Operated Pedestrian Doors.
C. ANSI/UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.4 SYSTEM DESCRIPTION

A. Doors Powered to Open Position:
   1. Doors powered by DC electric motor and mechanical gear assembly transmitted to active leaves by fiberglass-reinforced tooth drive belt for silent operation. Doors using roller chain, cable, or hydraulic devices shall not be accepted.
   2. Power door to open position by signals received by microprocessor from the actuation controls.
   3. The last portion of the opening cycle shall be controlled by a microprocessor generated signal that electronically reduces voltage to motor until door is fully open. Door systems that use microswitches shall not be accepted.
   4. To permit safe passage if an obstruction is detected between opening doors and surrounding walls or interior fittings, the doors shall immediately stop and after a delay go to the full closed position. Door systems that only monitor the door travel while closing shall not be acceptable.
B. Doors Powered to Closed Position:
   1. The active leafs will only be powered to closed position when all actuating devices are cleared and after remaining in the open position for a preset time delay (per ANSI 156.10).
   2. The last portion of the closing cycle shall be controlled by a microprocessor generated signal that electronically reduces voltage

to the motor until door is fully closed.

3. To permit safe passage between closing doors, the doors immediately reverse to open position if an obstruction is detected, then resume their interrupted movement at low speed to check whether the obstruction has disappeared or not. Door systems that only monitor the door travel while opening shall not be acceptable.

C. Emergency Breakaway:

D. Watchdog Monitoring:

1. Microprocessor Software: Constantly monitor drive train system operations.
2. Watchdog Control Circuit: Assume command of system and shut down automatic function by holding doors open, should door speed, motor function, or drive train operations deviate from design criteria ranges.
3. Secondary Supervisory Circuit: Monitor main Watchdog control circuit every 255 door cycles, ready to perform as a backup. Door systems that do not monitor control circuits every 255 cycles will not be accepted.

E. Energy Saving Device:

1. Position Switch: interior, jamb mounted
2. Door Opening Settings: Off, exit only, 2-way traffic, partial opening, and hold fully open.
3. Partial Opening Mode: Switch reduces total door opening to reduce conditioned air loss.
4. Heavy Weather Pile: Between doors and sidelites and between emergency breakaway hardware and door stiles.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide doors that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

B. Compliance:

1. ANSI/BHMA 156.10.
2. ANSI/UL 325 listed.
3. Air Infiltration per ASTM E283-91 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across Specimen.

C. Automatic door equipment accommodates medium to heavy pedestrian traffic.

D. Automatic door equipment accommodates up to following weights for active leaf doors:
   1. Bi-Part Doors: 220 pounds (100 kg) per active leaf.
E. Operating Temperature Range: -31° F to 122° F (-35° C to 50° C).
F. Motion and Presence Detection System: Uses planar K-band microwave technology to detect motion and focused active infrared technology to detect presence, in a single housing.

1.6 SUBMITTALS

A. Comply with Section 01330 - Submittal Procedures.
B. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, materials, and fabrication of doors, frames, sidelites, operator, motion/presence sensor control device, anchors, hardware, finish, options, and accessories.
D. Samples: Submit manufacturer's samples of aluminum finishes.
E. Test Reports: Submit certified test reports from UL, CUL, and ICBO indicating doors comply with specified performance requirements.
F. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.
G. Manufacturer's Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA 156.10 after completion of installation.
H. Operation and Maintenance Manual:
   1. Submit manufacturer's operation and maintenance manual.
   2. Include spare parts list.
I. Warranty: Manufacturer's standard warranty shall be one year from date of installation.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 10 years successful experience.
   2. Member: American Association of Automatic Door Manufacturers (AAADM).
   3. Door, frame, operator, and sensor components from same manufacturer.
B. Installer's Qualifications:
   1. Minimum of 2 years successful experience in installation of similar

doors.

2. Local certified Besam distributor.
4. Approved by manufacturer.
5. AAADM certified

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site protected from damage.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials and finish from damage during handling and installation.

1.9 MAINTENANCE SERVICE

A. The manufacturer shall offer a dispatch procedure that shall be available 24 hours per day, 365 days per year to facilitate proper service capability.

B. A manufacturer's designated service contact shall obtain malfunction information and dispatch appropriate service provider to project location.

C. A geographically assigned installation provider shall be trained and certified to provide maintenance service.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Besam Entrance Solutions, or approved equal.

2.2 AUTOMATIC SLIDING DOORS

A. Model: UniSlide automatic sliding doors.

1. Automatic Sliding Door System: The system shall consist of sliding aluminum doors, header, operator, threshold track and actuating controls. The header will include the Presence Sensor Control System that is self-monitoring and communicates with the system through a monitoring connection. The self-monitoring connection allows the door to go into a failsafe mode in the event of a sensor or monitoring failure. Door systems that do not employ a fail-safe self-monitoring system will not be acceptable.
2. Surface-applied, electro-mechanical, microprocessor-controlled, sliding door operator.
3. Operator housing, floor rollers, and door carriers.

B. Dimensions:

1. Sliding Aluminum Doors: Refer to door schedule for size. Provide door units to dimension heights and widths with corresponding stile glazing as shown on construction documents. Glass stops as specified

shall be available for all door panels and transom. The bi-part sliding door system shall include a two-point lock securing the lead edges of the door stiles together and to the hanger assembly. All doors shall have horizontal door extrusions, including optional muntins, with the design characteristic to ***nest or interlock*** into the intersecting vertical member. This design feature is to restrict any twisting or movement of the horizontal member that can produce open sightlines and / or compromise the door leaf integrity. The door package shall include security ball catches that latch the swing out panels in the closed position when the sliding doors are in the fully closed position. The active sliding door shall be provided with a key cylinder on the exterior and a thumb turn on the interior in accordance with NFPA 101.

2.3 ALUMINUM DOORS AND FRAMES

A. Doors and Frames: Extruded aluminum, Alloy 6063-T5.
   1. Hydraulic dampers (optional): provide 90 degree stop and cushion door upon opening and closing during emergency breakout conditions.

B. Glass:
   1. Glazing Material: ANSI Z97.1.
   2. Active Leaves: 1/4-inch (6-mm) glass
   3. Field-glazed or preglazed.

C. Door Operation:
   1. Shall be door system with UltraView™ Technology for bi-part directional operation. In compliance with NFPA 101, all panels shall allow "breakout" to the full open position or battery backup to provide instant egress at any point in the door's movement. To allow safe egress, automatic operation shall be discontinued when any panels are in the "breakout" mode. Doors and sidelites shall be sized to prevent pinch points at meeting stiles.

D. Aluminum Frame and Extrusions:
   1. Structural wall thickness to be no less than .125". Glass stops shall have .062" wall thickness.

E. Header Case:
   1. Shall be 7" x 6-5/8" architecturally enhanced extruded aluminum profile with recessed sensors on each side to meet ANSI A156.10-05. Header shall be capable of supporting bi-parting doors of 220 pounds per leaf over a span of 14'-0" without intermediate supports when using ¼" glass. Operator shall be capable of handling doors up to 220 pounds (100 kg). It shall contain door operator and door

mounting components. The header shall be a "closed design" to reduce infiltration of airborne contaminants and debris which may inhibit proper operation and facilitate increased service requirements. Headers with visible underside carrier openings of 1/2" or greater, whether in the open or closed positions, shall not be accepted.

F. Roller Composition:

1. Shall consist of two (2) steel roller wheels per door leaf having a 1-3/4" (44mm) diameter with single journal sealed oil-impregnated bearings to ensure roller life on a "replaceable" Delrin track to reduce service cost from normal usage and incorporate self-aligning anti-risers to ensure proper panel positioning. Rollers of any urethane composition shall not be accepted. The assembly shall allow the sliding doors to swing outward and facilitate emergency egress in accordance with NFPA 101.

G. Stiles: Wide – 5"

H. Pivots: Top and bottom concealed pivots, extruded aluminum.

I. Hardware: Breakaway.

J. Exterior Glazing Stop Extrusion: Nonremovable, security-type glazing bead to prevent unauthorized entry. Doors utilizing removable exterior stops will not be accepted.

2.4 SLIDING DOOR OPERATION

A. Door Operator and Controller:

1. Shall be a electro-mechanical controlled unit. The operator shall integrate a high-efficiency, energy efficient, DC motor requiring a minimum of 3 A current draw, allowing 5 door systems on one 20 A circuit. The supplied system shall have the capability to operate at full performance well beyond a brown out and high line voltage conditions (85V – 265V) sensing changes and adjusting automatically. The operator shall be of the type to allow an adjustable hold open time delay of 0 to 60 second having internal software to incorporate a self-diagnostic system.

2. Convenience Battery: Shall be concealed in header and capable of full operation with blackout conditions, including sensor capabilities for minimum of 100 cycles.

3. Operator will be delivered with the capability of being connected to an emergency backup circuit.

B. Microprocessor Control Box:

1. Factory-adjusted configuration, with opening and closing speeds set to comply with ANSI A156.10 requirements. Should the drive train

operations deviate from design criteria ranges, Watchdog Control Circuit Monitoring will assume command of the system and shut down the automatic function allowing a secondary supervisory circuit to perform as a backup.

C. Accessories:

1. The Automatic Sliding Door System shall have the following accessories to reduce energy loss: Adjustable nylon sweep(s) on the bottom of the sliding door(s), double pile weather stripping for the sliding door lead edges, single pile weather stripping between the carrier and the header on the lead stile(s) of the sidelight(s) and the pivot stile(s) of the sliding door(s), and a selector switch located on the interior side of the unit to allow door(s) to open at full or reduced width according to weather and traffic conditions.

2.5 ACTIVATION AND SAFETY CONTROL DEVICES

A. General: Provide the types of activation and safety devices specified, for the condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

B. Safety Presence Sensors:

1. Header Mounted Safety Sensor: Shall be a Besam Overhead Safety Sensor utilizing active infrared reflection technology to detect presence from a single housing mounted on each side of the header.
2. Breakout Beam: Shall be a transmitter/receiver mortised assembly with an infrared photoelectric beam, to stop the sliding door movement when the door is in the breakout position and breaks the photoelectric beam.
3. Presence detecting sensors to be field installed and adjusted.

C. Knowing Act Activation:

1. Sensor Plate: Touchless, Provide sensor switch designed for touchless activation of automatic doors.
2. Manufacturered by Larco or approved equal.
3. CE and FCC approved.
4. Technology: microwave with adjustable range of 2 inches to 24 inches
5. Operation Mode: Sense: Activate when there is a motion. Switch: Relay toggles when there is a motion.

6. Color: Grey.
7. Provide all additional wiring and componentry as required to connect sensor device to Door Controller for fully operable condition

2.6 ADJUSTMENTS

1. At no additional cost to the owner, manufacturer must furnish with close out documents, any special tools or devices that may be required for setup and / or service to equipment.
2. Adjustments by remote control or manually by push button.
3. LED indications to aid in the positioning of the infrared curtain. Proper LED indication shall signify compliance to applicable ANSI standard for safety pattern.

2.7 ELECTRICAL

A. High-Efficiency DC Motor: Maximum of 3 A current draw. Allow for 5 operators to run on one 20 Amp line.
B. Power: Self-detecting line voltage capable control. 120 V through 240V, 50/60 Hz, 3 A incoming power with solid-earth ground connection for each door system. 5 door systems on one 20 A circuit.
C. Wiring: Separate channel raceway free from moving parts.
D. Brown out/high voltage capability: System has capability to operate at full performance well beyond brown out and high line voltage conditions (85V – 265V) sensing changes and adjusting automatically.
E. Convenience Battery: Shall be concealed in header and capable of full operation with blackout conditions, including sensor capabilities for typically 100 cycles.

2.8 ALUMINUM FINISHES

A. Anodized: Clear, AA-C22A31.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine and measure areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent utilization of doors. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.
B. Ensure proper support has been provided at operator header.

C. Ensure floor is level and smooth.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and ANSI/BHMA 156.10.

B. Install doors and beam plumb, level, square, true to line, and without warp or rack.

C. Anchor frames securely in place.

D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.

E. Install exterior doors to be weathertight in closed position.

F. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

G. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:

1. Manufacturer's representative shall provide technical assistance and guidance for installation of doors.
2. Before placing doors in operation, AAADM certified technician shall inspect and approve doors for compliance with ANSI/BHMA 156.10-2005. Certified technician shall be approved and trained by manufacturer.

3.5 ADJUSTING

A. Adjust doors for proper operation in accordance with manufacturer's instructions and ANSI/BHMA 156.10-2005.

3.6 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage glass or finish.

3.7 PROTECTION

A. Protect installed doors and finish to ensure that, except for normal weathering, doors and finish will be without damage or deterioration at time of substantial completion.

END OF SECTION

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SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior doors with veneer, prefinish, prefit option.

B. Unless noted as door to remain, all doors listed are new doors.

C. Refer to finish schedule in drawings for additional information.

1.2 RELATED WORK

A. Metal door frames: Section 08 11 13, HOLLOW METAL DOOR FRAMES.

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 DOOR FRAMES, Section 08 14 00, WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.

D. Door Protection: Section 10 26 00, WALL AND DOOR PROTECTION

E. Lead Lined Wood Doors: Section 13 49 00, RADIATION PROTECTION

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.

C. Shop Drawings:

1. Show every door in project and schedule location in building.
2. Indicate type, grade, finish and size; include detail of glazing, louvers, sound gasketing and pertinent details.
3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

D. Laboratory Test Reports:

1. Screw holding capacity test report in accordance with WDMA TM-10.
2. Split resistance test report in accordance with WDMA TM-5.
3. Cycle/Slam test report in accordance with WDMA TM-7.
4. Hinge-Loading test report in accordance with WDMA TM-8.

1.4 WARRANTY

A. Doors are subject to terms of Article titled "Warranty of Construction", FAR clause 52.246-21, except that warranty shall be as follows:

1. For interior doors, manufacturer's warranty for lifetime of original installation.
2. Specified STC RATING for sound retardant rated door assembly in place.

1.5 DELIVERY AND STORAGE

A. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.

B. Store in accordance with WDMA I.S.1-A, J-1 Job Site Information.

C. Label package for door opening where used.

1.6 APPLICABLE PUBLICATIONS

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

B. Window and Door Manufacturers Association (WDMA):

I.S.1-A-04.....Architectural Wood Flush Doors
I.S.4-07a.....Water-Repellent Preservative Non-Pressure Treatment for Millwork
I.S.6-08.....Wood Stile and Rail Doors
I.S.6-A-01.....Architectural Stile and Rail Doors
TM-5-90.....Test Method to Determine the Split Resistance of Stile Edges of Wood Doors
TM-6-08.....Adhesive Bond Durability Test Method
TM-7-08.....Cycle-Slam Test Method
TM-8-08.....Hinge Loading Resistance Test Method
TM-10-08.....Screw Holding Test Method

C. National Fire Protection Association (NFPA):

80-07.....Fire Doors and Windows
252-03.....Fire Tests of Door Assemblies

D. ASTM International (ASTM):

E90-04.....Fire Tests of Door Assemblies

PART 2 – PRODUCTS

2.1 FLUSH DOORS

A. General:

Provide doors with wood veneer & finish per drawings:

1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
2. Adhesive: Type II
3. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.

B. Face Veneer:

1. In accordance with NWWDA I.S.1-A.
2. One species throughout the project unless scheduled or otherwise shown.
3. For transparent finishes:
   a. In existing buildings, where doors are required to have transparent finish, use wood species and grade of face veneers to match adjacent existing doors.
4. Factory sand doors for finishing.

C. Wood for stops, louvers, muntins and moldings of flush doors required to have transparent finish:

1. Solid Wood of same species as face veneer, except maple may be used on birch doors.
2. Glazing:
   a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.

2.2 PREFINISH, PREFIT OPTION

A. Flush doors may be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.

C. Flush doors to receive transparent finish (in addition to being prefit) shall be factory finished as follows:

1. WDMA I.S.1A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.

2.3 IDENTIFICATION MARK:

A. On top edge of door.

B. Either a stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, code date of manufacture and quality.

C. Accompanied by either of the following additional requirements:

1. An identification mark or a separate certification including name of inspection organization.
2. Identification of standards for door, including glue type.
3. Identification of veneer and quality certification.
4. Identification of preservative treatment for stile and rail doors.

2.4 SEALING:

Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

2.5 LOUVERS

A. General:

1. Sight proof type with stationary blades the full thickness of the door.
2. Design lightproof louvers to exclude passage of light but permit free ventilation.

B. Fabrication:

1. Steel louvers 0.8 mm (0.032 inch) thick for interior doors.
2. Fabricate louvers as complete units. Install in prepared cutouts in doors.
3. Weld stationary blades to frames. Screw louvers into door openings.

PART 3 – EXECUTION

3.1 DOOR PREPARATION

A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.

B. Clearances between Doors and Frames and Floors:

1. 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. Maximum clearance at bottom of sound rated doors, light-proofed doors, doors to operating rooms, and doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).

C. Provide cutouts for special details required and specified.

D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.

E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness, undercut where shown.

F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.

G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

Install doors and hardware as specified in Section, INSTALLATION OF DOORS AND HARDWARE.

3.3 DOOR PROTECTION

A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.

B. Provide protective covering over knobs and handles in addition to covering door.

C. Maintain covering in good condition until removal is approved by Resident Engineer.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies access doors or panels.

1.2 RELATED WORK:

A. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.

B. 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, and installation details. Show all the proposed locations of access door for approval.

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(2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-08a.....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):

80-07.....Fire Doors and Windows

E. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....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 (typ.), stainless steel sheet (in restrooms), 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.
   3. Provide expanded galvanized metal lath perimeter wings when installed in plaster except veneer plaster.

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 (typ.), or 1.5 mm (0.0598 inch) thick stainless steel sheet (in restrooms).
2. Reinforce to maintain flat surface.

B. Frame:
1. Form of 1.5 mm (0.0598 inch) thick steel (typ.), or stainless steel sheet (in restrooms) 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.
4. Provide expanded galvanized metal lath perimeter wings when installed in plaster except veneer plaster.

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. Provide tamper proof screws (spanner head locks) for access panels in Psychiatric Areas.

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, finish coat to match surrounding color(typical).

C. Stainless Steel: No. 4 for exposed surfaces (in restrooms).

2.5 SIZE:

Minimum 600 mm (24 inches) square door unless otherwise shown.

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.

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.

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SECTION 08 33 00
COILING DOORS AND GRILLES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies coiling doors and grilles of sizes shown, complete as specified.

1.2 RELATED WORK

A. Lock cylinders for cylindrical locks: Section 08 71 00, DOOR HARDWARE.

B. Field painting: Section 09 91 00, PAINTING.

C. Electric devices and wiring: DIVISION 26, ELECTRICAL.

D. Deal trays of a Forced Entry/Ballistic Resistant rating: Section 08 56 59, SERVICE AND TELLER WINDOW UNITS.

E. Guard Booths: Section 13 34 19, METAL BUILDING SYSTEMS.

1.3 MANUFACTURER'S AND INSTALLER'S QUALIFICATIONS

A. Coiling doors and grilles shall be products of manufacturers regularly engaged in manufacturing items of type specified.

B. Install items under direct supervision of manufacturer's representative or trained personnel.

1.4 FIRE DOOR REQUIREMENTS

Where fire doors exceed the size for which testing and labeling is available, submit certificates stating that the doors and hardware is identical in design, materials, and construction to a door that has been tested and meets the requirements for the class indicated.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each type of door and grille showing details of construction, accessories and hardware, electrical and mechanical items supporting brackets for motors, location, and ratings of motors, and safety devices.
2. Wiring diagrams for motors and controls, including wiring diagram for door and grille, showing electrical interlock of motor with manually operated dead lock, electrical rough-in.

C. Manufacturer's Literature and Data:

1. Brochures or catalog cuts, each type door or grille.
2. Manufacturer's installation procedures and instructions.
3. Maintenance instructions, parts lists.

D. Certificates:

1. Attesting doors, anchors and hardware will withstand the horizontal loads specified.
2. Attesting oversize fire doors and hardware are identical in design, material, and construction to doors that meet the requirements for the class specified.

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):

A36/A36M-08.....Structural Steel

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A653/A653M-08.....Steel Sheet, Zinc-Coated (Galvanized) Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

B209/209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221/B221M-08.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C. National Electrical Manufacturers Association (NEMA):

ICS 1-00(R2005).....Industrial Control and Systems General Requirements

ICS 2-00(R2005).....Industrial Control, and Systems, Controllers, Contactors, and Overload Relays

ICS 6-93 (R2006).....Industrial Control and Systems Enclosures

MG 1-06.....Motors and Generators

ST 20-92 (Rl997).....Dry-Type Transformers for General Applications

D. Master Painters Institute (MPI):

MPI #35.....Exterior Bituminous Coating

MPI #76.....Quick Drying Alkyd Metal Primer

E. National Fire Protection Association (NFPA):

70 (current edition)....National Electrical Code 1999 Edition

80-07.....Fire Doors and Fire Windows

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

AMP 500-06.....Metal Finishes Manual

G. Underwriters Laboratories, Inc. (UL):

2007.....Fire Resistance Directory

PART 2 - PRODUCTS

2.1 MATERIAL

A. Steel: A653 for forming operation. ASTM A36 for structural sections.

B. Stainless Steel: ASTM A167, Type 302 or 304.

C. Aluminum, Plate and Sheet: ASTM B209/B209M

D. Aluminum, Extruded: ASTM B221/B221M

E. Alkyd Metal Primer: MPI No. 76.

F. Bituminous Coating: MPI No. 35.

2.2 DESIGN REQUIREMENTS

A. Coiling doors and grilles shall be spring counter balanced, overhead coiling type, inside face mounted with guides at jambs set back a sufficient distance to provide a clear opening when door is in open position.

B. Doors, hardware, and anchors shall be designed to withstand a horizontal 250psf of door area without damage.

C. All motor operators shall have manual emergency mechanical operators.

D. Fire rated doors shall conform to the requirements specified herein and to NFPA 80 for the class indicated. Doors shall bear Underwriters Laboratories, Inc. label indicating the applicable fire rating.

E. Where doors or grilles in excess of 7.4 m^2 (80 sf) are indicated to be manually operated, provision shall be made in the design and construction that will permit future installation of electric-power operation.

F. The coiling door shall be superimposed over the coiling grille in a common assembly where dual installation is required.

2.3 FABRICATION

A. Curtains:

1. Form of interlocking slats of aluminum of shapes standard with the manufacturer, except that slats for exterior doors shall be flat type.
2. Thickness of slats shall be as required to resist loads specified except not less than the following:
   a. For doors less than 4500 mm (15 feet) wide: 0.75 mm (0.0299 inch).
   b. For doors from 4530 mm (15 feet 1 inch) to 6300 mm (21 feet wide): 0.90 mm (0.0359 inch).

c. For doors wider than 6330 mm (21 feet 1 inch): 1.20 mm (0.0478 inch).

3. Thickness of aluminum slats shall be as follows:
   a. For doors less than 4500 mm (15 feet wide): 1 mm (0.040 inch).
   b. For doors from 4530 mm (15 feet 1 inch) to 6300 mm (21 feet wide): 1.45 mm (0.057 inch).
   c. For doors wider than 6330 mm (21 feet 1 inch): 1.65 mm (0.064 inch).

B. Grilles:
1. Form of aluminum.
2. Horizontal rods, 8 mm (5/16 inch) minimum diameter spaced not over 50 mm (two inches) on center with hinged vertical connecting links. Links shall be spaced not over 225 mm (nine inches) apart.
3. Provide tubular bottom rail at bottom end of grille.

C. Endlocks and Windlocks:
1. Manufacturer's stock design of galvanized malleable iron or galvanized steel or stamped cadmium steel for doors or grilles.
2. The ends of each slat for exterior doors and each alternate slat for grilles and interior doors shall have endlocks.
3. Doors shall have windlocks at ends of at least every sixth slat. Windlocks shall prevent curtain from leaving guide because of deflection from wind pressure or other forces.

D. Bottom Bar:
1. Two angles of equal weight, one on each side, standard extruded aluminum members not less than 3 mm (0.125 inch) thick.
2. Bottom bar designed to receive weather-stripping and safety device, and be securely fastened to bottom of curtain or grille.

E. Barrel and Spring Counterbalance:
1. Curtain shall coil on a barrel supported at end of opening on brackets and be balanced by helical springs.
2. Barrel fabricated of steel pipe or commercial welded steel tubing of proper diameter and thickness for the size of curtain, to limit deflection with curtain rolled up, not to exceed 1 in 400 (0.03 inch per foot) of span.
3. Close ends of barrel with cast iron plugs, machined to fit the opening.

4. Within the barrel, install an oil-tempered, helical, counter balancing steel spring, capable of producing sufficient torque to assure easy operation of the door curtain from any position.
5. At least 80 percent of the door weight shall be counter balanced at any position.
6. Spring-tension shall be adjustable from outside of bracket without removing the hood or motor operator.

F. Brackets:
1. Steel plate designed to form end closure and support for hood and the end of the barrel assembly.
2. End of barrel or shaft shall screw into bracket hubs fabricated of cast iron or steel.
3. Equip bracket hubs or barrel plugs with prelubricated ball bearings, shielded or sealed.

G. Hoods:
1. Steel galvanized, 0.6 mm (0.0239 inch) thick Aluminum, not less than 1 mm (0.040 inch) thick.
2. Form hood to fit contour of end brackets.
3. Reinforce at top and bottom edges with rolled beads, rods or angles. Hoods more than 3600 mm (12 feet) in length shall have intermediate supporting brackets.
4. Fasten to brackets with screws or bolts and provide for attachment to wall with bolts.
5. Provide a weather baffle at the lintel or inside the hood of each exterior door to minimize seepage of air through the hood enclosure.

H. Guides:
1. Manufacturer's standard formed sections or angles of aluminum.
   a. Aluminum sections not less than 5 mm (0.1875 inch) thick.
2. Form a channel pocket of sufficient depth to retain the curtain in place under the horizontal pressure specified, and prevent ends of curtain from slipping out of guide slots.
3. Top sections flared for smooth entry of curtain to vertical sections that will facilitate entry of curtain.
4. Provide stops to limit curtain travel above top of guides.
5. Provide guide of aluminum with replaceable wear strips to prevent metal to metal contact.
6. Mounting brackets shall provide closure between guides and jambs.

I. Weather-stripping:

1. Manually Operated Doors: Exterior doors shall have a compressible and replaceable rubber, neoprene, or vinyl weather seal attached to bottom bar.
2. Motor Operated Doors: Bottom bar safety device shall be a combination compressible seal and safety device as specified in paragraph, ELECTRIC MOTOR OPERATORS.
3. At exterior doors provide replaceable sweep type continuous vinyl or neoprene weather seals on guides and across head on exterior to seal against wind infiltration.

J. Locking:

1. Cylinder locks shall receive standard screw in cylinders furnished under Section, 08 71 00 DOOR HARDWARE.
2. For each manually operated exterior door or grille, provide manufacturer's standard cylinder dead lock type locking device on the inside at each door jamb, key operated from the exterior and interior by turn knob.
3. For motor operated doors and grilles provide manufacturer's standard cylinder dead lock type locking device on the inside, key operated from both sides, interlocked with motor to prevent motor from operating when locks are activated.

2.4 ELECTRIC MOTOR OPERATORS

A. Provide operators complete with electric motor, machine cut reduction gears, steel chain and sprockets, magnetic brake, overload protection, brackets, push button controls, limit switches, magnetic reversing contactor, and other accessories necessary for proper operation including emergency manual operator.

B. Design:

1. Design the operator so that the motor may be removed without disturbing the limit-switch timing and without affecting the emergency manual operators.
2. Make provision for emergency manual operation of door by chain-gear mechanism.
3. Arrange the emergency manual operating mechanism so that it may be immediately put into and out of operation from the floor with an electrical or mechanical device, which will disconnect the motor from the operating mechanism when the emergency manual operating

mechanism is engaged, and its use shall not affect the timing of the limit switches, in case of electrical failure.

4. Provide interlock with motor to prevent motor from operating when manual locks are activated.

C. Motors:

1. Motors shall conform to NEMA MG1, suitable for operation on current of the characteristics indicated, and shall operate at not more than 3600 rpm.
2. Motors shall be high starting torque, reversible type, of sufficient horsepower and torque output to move the door in either direction from any position, and produce a door travel speed of not less than 0.66 foot or more than one foot per second, without exceeding the rated capacity.

D. Controls:

1. The control equipment shall conform to NEMA ICS 1 and 2.
2. Control enclosures shall be NEMA ICS 6, Type 12 or Type 4, except that contractor enclosures may be Type 1.
3. Remote control switches shall be at least 1500 mm (5 feet) above the floor line, and located so that the operator will have complete visibility of the door at all times.
4. Each door motor shall have an enclosed, across-the-line type, magnetic reversing contactor, thermal overload protection, solenoid operated brake, limit switches, and remote control switches at locations shown.
5. Use key activated switches on exterior requiring constant pressure to operate.
6. Use three-button type, push button switch on interior, unless noted to be key activated, with the buttons marked, OPEN, CLOSE, and STOP.
   a. The OPEN and STOP buttons shall be of the type requiring only momentary pressure to operate. The CLOSE button shall be of the type requiring constant pressure to maintain the closing motion of the door. When the door is in motion, and the STOP button is pressed, the door shall stop instantly and remain in the stop position; from the stop position, the door may then be operated in either direction by the OPEN or Close buttons.
   b. Push buttons shall be full-guarded to prevent accidental operation.

7. Provide limit switches to automatically stop the doors at their fully open and closed positions. Positions of the limit switches shall be readily adjustable.
8. Safety device:
   a. The bottom bar of power-operated doors shall have a fail safe safety device that will immediately stop and reverse the door in its closing travel upon contact with an obstruction in the door opening, or upon failure of the device, or any component of the device, or any component of the control system, and cause the door to return to its full open position. The door closing circuit shall be electrically locked out, and the door shall be operable manually until the failure or damage has been corrected.
   b. Safety device shall not be used as a limit switch.
   c. Safety device connecting cable to motor shall be flexible "Type SO" cable and spring loaded automatic take up reel or equivalent device, as required for proper operation of the doors.
9. Transformer:
   a. Provide a control transformer in power circuits as necessary to reduce the voltage on the control circuits to 120 volts or less.
   b. The transformer shall conform to NEMA ST20.
10. Electrical components shall conform to NFPA 70. Electrical materials, equipment, and devices for installation in hazardous locations as defined by NFPA 70 shall be specifically approved by Underwriters Laboratories for the particular chemical group and the class and division of hazardous location involved.

2.5 MANUAL OPERATORS

A. Push-up Operation:
   1. Provide one lifting handle on each side of door and counterbalance in a manner to provide easy operation while raising or lowering the curtain by hand.
   2. The maximum exertion or pull required for lift handle operation shall not exceed 1197 Pa (25 psf).
   3. Provide pull-down straps or pole hooks on bottom rail of doors over 2100 mm (7 feet) high.

B. Hand Chain Operation:
   1. Galvanized, endless chain operating over a sprocket and extending to within 900 mm (3 feet) of floor.

2. Obtain reduction by use of suitable permanently lubricated gearing connected by roller chain and sprocket drive.
3. Calculate gear reduction to reduce pull required on hand chain, not to exceed 1676 Pa (35 psf).

C. Crank Operation:
1. Locate crank approximately 854 mm (34 inches) above the floor.
2. Connect vertical shaft, gear box, and gears to curtain.
3. Calculate gear reduction to reduce pressure exerted on crank to not over 958 Pa (20 pounds).

2.6 FIRE DOORS

A. B-labeled fire doors shall be complete with hardware, accessories, and automatic closing device as required by NFPA 80.

B. Equip fire doors with an automatic closing mechanism actuated by fusible links to release at 54 °C (130 °F).

C. Doors shall be forced into a closed position by an auxiliary spring in the barrel which is inoperative during normal operation and when activated will not affect the adjustment of the counterbalance spring. The auxiliary spring shall exert pressure on the curtain until the release device is reset. Door shall come to rest on the floor without impact.

D. Control descent of curtain by an oscillating governor.

E. Provide handles for push up operation.

2.7 FINISHES

A. Steel:
1. Clean surfaces of steel free from scale, rust, oil and grease, and then apply a light colored shop prime paint after fabrication.
2. Non-galvanized steel: Treat to assure maximum paint adherence, and apply corrosion inhibitive primer.
3. Galvanized steel: Apply a phosphate treatment and a corrosion inhibitive primer.

C. Aluminum: Finish exposed metal surfaces as follows:
1. Medium matte, with clear anodic coating, Class I Architectural, 0.7 mils thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors and grilles in accordance with approved shop drawings and manufacturer's instructions.

B. Locate anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories accurately.

C. Securely attach guides to adjoining construction with not less than 9 mm (3/8 inch) diameter bolts, near each end and spaced not over 600 mm (24 inches) apart.

D. Locate control switches where shown.

E. Install all electric devices and wiring as specified in DIVISION 26 ELECTRICAL and DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

3.2 REPAIR

A. Repair prime painted zinc-coated surfaces and bare zinc-coated surfaces that are damaged by the application of galvanizing repair compound. Spot prime all damaged shop prime painted surfaces including repaired prime painted zinc-coated surfaces.

B. Coiling Doors and grilles shall be lubricated, properly adjusted, and demonstrated to operate freely.

3.3 PROTECTION

A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze or other metals not compatible with aluminum by one of the following:

1. Paint the dissimilar metal with a prime coat of zinc-Molybdate or other suitable primer, followed by two coats of aluminum paint.
2. Place an approved caulking compound, or a non-absorptive tape, or gasket between the aluminum and the dissimilar metal.

B. Paint aluminum in contact with or built into mortar, concrete, plaster or other masonry materials with a coat of bituminous paint.

C. Paint aluminum in contact with wood or other absorptive materials, that may repeatedly become wet, with a coat of bituminous paint or two coats of aluminum paint.

3.4 INSPECTION

Upon completion, doors shall be weathertight and doors and grilles shall be free from warp, twist, or distortion.

- - - E N D - - -

SECTION 08 33 43
FIRE & SMOKE RATED CURTAINS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Provide all materials, labor, equipment and services necessary to furnish, deliver and install all work under this section as shown on the contract documents, specified herein, and as specified by the job conditions.

B. Paint all exposed metal of curtain assembly without compromising the fire and smoke characteristics.

1.02 DESCRIPTION

A. Related work specified elsewhere:

1. Metal Fabrication.	Section 05 50 00
2. Rough Carpentry.	Section 06 10 00
3. Access Doors & Frames:	Section 08 31 13
4. Painting:	Section 09 91 00
5. Electrical:	Division 26

1.03 SUBMITTALS

A. Procedures: Furnish submittals in accordance with the general requirements specified.

B. Shop Drawing: Furnish shop drawings for approval. Include elevations, sections, and details indicating dimensions, materials, finishes, conditions for anchorage and support of each fire and smoke rated curtain.

C. Product Literature: Submit manufacturer's technical literature describing the product to be used under this section.

D. Maintenance and Operating Manuals: Furnish complete manuals describing the materials, devices and procedures to be followed in operating and maintaining all of the fire and smoke rated curtains under this section. Include manufacturer's brochures and parts lists describing the actual materials used in the product.

E. Product Approval Reports: Submit copy of manufacturer's Listing Report and Authorization To Mark clearly detailing the description of product, fire endurance test method, test results and test conclusions of the test criteria as conducted and witnessed by a United States accredited testing laboratory such as Underwriters Laboratories (UL) or Intertek-Warnock Hersey (Intertek). Testing agency's Listing Report shall clearly state that the fire and smoke rated curtains have been tested and approved to the standards and criteria of UL 10B (20 minutes), UL 10D (3 hours) and UL 1784 Smoke & Draft rating.

1.04 QUALITY ASSURANCE

A. Fire & Smoke Rated Assemblies: Provide all curtains with fire and smoke resistance rating required to comply with governing regulations which are inspected, tested, listed and labeled by UL or Intertek and complying with

NFPA 80 for class of opening. Provide units tested, approved and labeled under the UL 10B, UL 10D and UL 1784 standards. Provide testing agency label permanently fastened to each fire curtain assembly as evidence of product compliance.

B. Oversize Assemblies: Where units exceed the testing laboratory's label size, an Oversize Certificate label issued by either UL or Intertek shall be provided and permanently fastened to each fire curtain assembly as evidence of product compliance. Oversize assemblies requiring the joining of curtain sections together on site by the installer must require documented field certification by UL or Intertek.

C. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of federal, state and municipal authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

A. General: Deliver and store materials in manufacturer's original packaging, labeled to show name, brand and type. Store materials in a protected dry location off the ground in accordance with manufacturer's instructions.

1.06 WARRANTY

A. Fire & Smoke Rated Curtain Warranty: Furnish two (2) year written warranty signed by the manufacturer and installer agreeing to repair or replace work which has failed as a result of defects in materials or workmanship. Upon notification within the warranty period, such defects shall be repaired at no cost to the owner.

PART 2 PRODUCTS

2.01 FIRE & SMOKE RATED CURTAINS

A. Manufacturer: Fire and smoke rated curtains shall be the FireFighter™ Series model D200 as manufactured by McKeon Door Company, Bellport, NY, or approved equal.

B. Fire and Smoke rating requirement: B label, 1.5 hrs.

C. Size: Approximately 6'W x 8'H. Refer to drawings for location. Field verify existing conditions.

2.02 MATERIALS

A. Curtain: Shall be of EFP4/1000 type reinforced fabric curtain, consisting of a satin fiberglass fabric with integral stainless steel wire weave and a minimum of 1.5 hour fire retardant polyurethane coating. Curtain shall be at minimum no less than .054 cm thick.

B. Bottom Bar: Shall consist of a tubular member formed to fit curtain, provide stiffness, limit deflection and allow for a tight fitting closure. Bottom bar shall be designed of adequate size and weight to keep the curtain fully extended, taut and level when the unit is activated to the self-closing position while preventing any deflection caused by the building's air pressure currents.

C. Guide Assemblies: Each guide assembly shall be fabricated of a steel mounting adjustment angle or channel with an integral pressure retaining side guide with a minimum 3-1/2" depth. Each pressure retaining guide shall be fitted with UL approved and classified smoke seals.

D. Mounting Brackets: Fabricated of minimum 14 gauge steel plates, brackets shall be provided to house and support ends of the barrel assembly.

E. Hood: Shall be provided to entirely enclose curtain and barrel assembly. Hood shall be fabricated of minimum 18 gauge galvanized steel formed to match brackets. Top and bottom shall be bent and reinforced for stiffness. Hood shall be fitted with UL approved and classified smoke seals.

F. Barrel Assembly: Fabricated of structural quality carbon steel seamless pipe of sufficient size and diameter to house operating motor drive, support curtain assembly and limit horizontal deflection of the fire and smoke curtain assembly.

G. Motor Drive Unit: Fire and smoke curtain shall be powered by an inboard 24 volt DC motor including gearbox assembly, electromechanical distance travel limit switches all linked to an internal 24 volt DC electromagnetic brake which allows the fire and smoke curtain to remain operational even during the loss of power to the motor drive unit.

H. Fail-Safe Release Device: A fail-safe release device shall be built into the motor drive unit as an integral part of the release mechanism. When power is interrupted to the release mechanism by an alarm condition, the fire and smoke curtain shall automatically self-close. In the event of power failure the time delay shall prevent the fire and smoke curtain from closing for a predetermined programmable period of 30 minutes, unless there is an alarm condition at which point the fire and smoke curtain shall immediately self-close. Once the predetermined programmable period of 30 minutes has lapsed, the fire and smoke curtain shall self-close. Once power has been restored and the alarm condition has been cleared, the release mechanism shall automatically reset and the fire and smoke curtain shall immediately become operable.

I. Easy Trip Test Feature: The fire and smoke curtain shall be designed so that it may be trip tested simply by activating the True-Test switch. By turning the True-Test switch to the "off" position, the draft curtain shall automatically self-close. Once the draft curtain assembly has satisfactorily closed, it shall be reset simply by turning the True-Test switch back to the "on" position. No ladders, tools or special equipment shall be required to test or reset the fire and smoke curtain.

J. Finish: After completion of fabrication, clean all metal surfaces to remove dirt and chemically treat to provide for paint adhesion. Hood, bottom bar and guide assembles shall be of a powder coat finish, white in color.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces and field conditions to which this work is to be performed and notify architect if conditions of surfaces exist which are detrimental to proper installation and timely completion of work.

B. Verify all dimensions taken at job site affecting the work. Notify the architect in any instance where dimensions vary.

C. Coordinate and schedule work under this section with work of other sections so as not to delay job progress.

3.02 INSTALLATION

A. Perform installation using only factory approved and certified representatives of the fire and smoke curtain manufacturer.

B. Install fire and smoke curtain assemblies at locations shown in perfect alignment and elevation, plumb, level, straight and true.

C. Adjust fire and smoke curtain installation to provide uniform clearances and smooth non-binding operation.

D. Install wiring in accordance with applicable local codes and the National Electrical Code Standard. Materials shall be UL listed.

E. Test fire and smoke curtain closing sequence when activated by the building's fire alarm system. Reset fire and smoke curtain after successful test.

3.03 PROTECTION AND CLEANING

A. Protect installed work using adequate and suitable means during and after installation until accepted by owner.

B. Remove, repair or replace materials which have been damaged in any way.

C. Clean surfaces of grime and dirt using acceptable and recommended means and methods.

END OF SECTION

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies glazed aluminum curtain wall system.
   1. Thermally isolated, pressure equalized on interior.
   2. Type: Unit and Mullion system to include following:
      a. Glass, Insulated Metal Panels Glass Spandrel Panels.
      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. Firestopping between curtain wall and structure: Section 07 84 00, FIRESTOPPING.
D. Sheet metal flashing and trim: Section 07 60 00, FLASHING AND SHEET METAL.
E. Joint sealants: Section 07 92 00, JOINT SEALANTS.
F. Aluminum windows: Section 08 51 13, ALUMINUM WINDOWS.
G. Glazing: Section 08 80 00, GLAZING.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Approval 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 type and size required for that project.
      b. Installer: Manufacturer approved in writing. Continuously installed glazed aluminum curtain walls systems for previous five (5) years.
      c. Manufacturer shall 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. Testing Laboratory: Contractor retained. Engage an 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.

e. Product Options: Information on Drawings and in Specifications 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 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.

f. Qualification of Welders:

1) Welding shall be performed by certified welders qualified in accordance with AWS D1.2, using procedures, materials, and equipment of the type required for this work.

B. Pre-Installation Conference

1. Prior to starting installation of glazed curtain wall system schedule conference with Contracting Officer to ensure following:

a. Clear understanding of drawings and specifications.

b. Onsite inspection and acceptance of structural and pertinent structural details relating to curtain wall system.

c. Coordination of work of various trades involved in providing system. Conference shall 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 shall 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, available 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 1:50 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, glazing details, and details of installation.
2. Submit for curtain wall system, accessories. Tentative approval of drawings shall be received before fabrication of mock-up. Final approval of drawings shall be deferred pending approval of mock-up and accessories. Drawings shall indicate in detail all system parts including elevations, full size sections, framing, jointing, panels, types and thickness of metal anchorage details, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.
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 300 mm (12-inch) long section by width of each tubular, or extruded shape section or 300 mm by 300 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 sample minimum 300 mm by 300 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section, and panel, one composite sample incorporating all components and features listed may be submitted.
3. Where normal color variations are anticipated, include 2 or more units in set indicating extreme limits of color variations.

E. Glass:
1. Specified in Section 08 80 00, GLAZING.

F. Quality Control Submittals:
1. Design Data:
   a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings shall be signed and sealed by a structural engineer registered in state in which project is to be located.
2. Factory Test Reports:
   a. Test Reports: Provide 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. Manufacturer shall submit appropriate testing numbers 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) 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.

G. Manufacturer's Certificates:

1. Submit Certificates of Compliance, with specification requirements, for the following:
   a. Metal extrusions.
   b. Metal accessories.
   c. Stating that aluminum has been given specified thickness of anodizing or organic coating finish.
   d. Indicating manufacturer's and installer's meet qualifications as specified.
   e. Submit list of equivalent size installations, for both manufacturer and installer, which have had satisfactory and efficient operation.

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. Indicate results of field testing of mockup field panel, and any directions given Contractor for corrective action.

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.

C. Prior to shipment from factory, place knocked-down lineal 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 shall permit easy access for inspection and handling. Sealing and caulking compounds, including handling, shall be in accordance with requirements of Section 07 92 00 JOINT SEALANTS.

1.6 PROJECT CONDITIONS

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):

MCWM-1-89.....Metal Curtain Wall Manual

CW 10-04.....Care and Handling of Architectural Aluminum from Shop to Site

CW 11-85.....Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing

CW 13-85.....Structural Sealant Glazing Systems (A Design Guide)

CWG 1-89.....Installation of Aluminum Curtain Walls

TIR A1-04.....Sound Control for Aluminum Curtain Walls and Windows

TIR A4-97.....Recommended Guide Lines for Reflective Insulating Glass

TIR A8-04.....Structural Performance of Poured and Debridged Framing Systems

TIR A9-91.....Metal Curtain Wall Fasteners

TIR A11-96.....Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads

101-I.S.2/A440-05.....Windows, Doors and Unit Skylights

501-05.....Methods of Test for Exterior Walls
503-03.....Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems
605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels
1503-98.....Thermal Transmission and Condensation Resistance of Windows, Doors and Glazed Wall Sections

C. American National Standards Institute (ANSI):
Z97.1-04.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

D. American Society of Civil Engineers (ASCE):
7-02-2003.....Minimum Design Loads for Buildings and Other Structures

E. American Society for Testing and Materials (ASTM):
A36/A36M-08.....Structural Steel
A123-08.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A193-08b.....Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service
A307-07b.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
B209-07.....Aluminum and Aluminum Alloy Sheet and Plate
B211-03.....Aluminum and Aluminum Alloy Bar, Rod, Wire
B221/B221M-08.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
B316/B316M-02.....Aluminum and Aluminum Alloy Rivet and Cold-Heading, Wire, and Rods
C578-08b.....Rigid Cellular Polystyrene Thermal Insulation
C612-04e1.....Mineral Fiber Block and Board Thermal Insulation
C920-08.....Elastomeric Joint Sealants
C794-06.....Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
C1363-05.....Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
D1037-06a.....Evaluating the Properties of Wood-Base Fibers and Particle Panel Materials
E84-08a.....Surface Burning Characteristics of Building Materials

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

E283-04.....Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Difference Across this Specification

E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

E331-00.....Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference

E413-04.....Classification for Rating Sound Insulation

E783-02.....Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

E1105-00 (2008).....Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors By Uniform or Cyclic Static Air Pressure Differences

F. American Welding Society, Inc. (AWS):

D1.2-03.....Structural Welding Code-Aluminum

G. Consumer Product Safety Commission (CPSC):

16 CFR 1201.....Architectural Glazing Standards and Related Material

H. Federal Specifications (FS):

TT-P-645B-90.....Primer, Paint, Zinc-Molybdate, Alkyd Type

I. Glass Association of North America (GANA):

01.....Glazing Manual (1997 Edition).

02.....Sealant Manual (1990 Edition).

03.....Laminated Glass Design Guide (2000 Edition).

04.....Tempered Glass Engineering Standard Manual (2001 Edition).

J. Military Specifications (MIL):

MIL-C-18480.....(Rev. B) Coating Compound, Bituminous Solvent, Coal Tar Base

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

500-06.....Metal Finishes Manual.

L. Steel Structures Painting Council (SSPC)
Paint 25-97 (2004).....Red Iron Oxide Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

1.8 WARRANTY

A. Submit manufacturer's written warranty for materials, installation and weathertightness, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to five (5) years from date of final acceptance of project by Government.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Design Requirements:

1. Curtain Wall System: Tubular aluminum sections with thermal break condition, supplementary support framing, factory prefinished, glass, insulated metal panel, spandrel infill, and louvers; related flashings, anchorage and attachment devices.
2. System Assembly: Site assembled.
3. No curtain wall framing member shall deflect, in a direction normal to plane of wall, more than 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of TIR A11 and tested in accordance with ASTM E330, except that when a surface will be affected, deflection shall not exceed 1/360 of span. No framing member shall have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E330 for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements. No glass breakage, damage to fasteners, hardware or accessories shall be permitted due to deformation stated above:
   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 MCWM-1.
   b. Curtain wall system components and integral door and/or window units shall be furnished by one manufacturer or fabricator; however, all components need not be products of same manufacturer.
   c. Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.

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.

B. Manufacturer's Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction 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 curtain walls that are similar to those indicated for this Project in material, design, and extent.

C. Performance Requirements:

1. System shall meet or exceed all performance requirements specified.
2. Curtain wall components shall have been tested in accordance with requirements below and shall meet performance requirements specified:
3. 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 with all applicable codes.
4. Water Penetration:
   a. No water penetration shall 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.
5. 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.
7. Deflections Test: ASTM E330, Procedure B:
   a. No member shall 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, shall 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 shall be minimum 1.5 mm (1/16 inch).

8. Delamination Test:
   a. Adhesively bonded metal-faced panels shall show no evidence of delamination, warpage or other deterioration or damage when subjected to the six "Accelerated Aging Cycles" specified in ASTM D1037.
9. Thermal Conductance Tests: ASTM C236.
   a. The thermal transmittance of opaque panels shall not exceed a U-value, Btu/hr/sq ft/ degree F, as required and indicated on contract drawings for exterior wall system, when tested in accordance with ASTM C236. Average calculated thermal transmittance of complete wall assembly including panels, windows, and all other components shall not exceed the designed U-value.
10. Window Tests:
   a. Windows shall meet the requirements specified in Section 08 51 13 ALUMINUM WINDOWS or Section 08 51 13.11, SIDE-HINGED ALUMINUM WINDOWS, except where requirements of this section differ, this section shall govern. Windows shall meet same requirements for deflection and structural adequacy as specified for framing members when tested in accordance with ASTM E330 except permanent deformation shall not exceed 0.4 percent; there shall be no glass breakage, and no permanent damage to fasteners, anchors, hardware, or operating devices. Windows shall have no water penetration when tested in accordance with requirements of ASTM E331.

2.2 MATERIALS

A. Extruded Aluminum Framing Members: ASTM B221M; 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; 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 A36M.

D. Primer: TS TT-P-645; red, for shop application and field touch-up.

E. Fasteners:

1. For Exterior Cap Retainers: ASTM A193 B8 300 series, stainless steel screws.
2. For Framework Connections: ASTM B211M 2024-T4 aluminum, ASTM A193 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: 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 shall 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 up to 25 mm (1 inch) 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 shall 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.
   b. If used in psychiatric facilities, the glass shall be retained in the framing system in such a manner that it can withstand lateral forces in excess of force required to break the glass. Plastic clips for holding glass are not permitted.

L. Firestopping: Refer to Section 07 84 00, FIRESTOPPING for requirements.

2.3 FABRICATION

A. Curtain wall components shall be of materials and thickness indicated or specified. Details indicated are representative of required design and profiles. Maintain sightlines indicated on drawings. Unless specifically indicated or specified otherwise, methods of fabrication and assembly shall be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices shall permit adjustment in three directions. There shall be no exposed fasteners.

B. Joints: Joints exceeding +1.5 mm (+1/16") shall 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 shall 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.

F. Concealed Interior Mullion Reinforcing: ASTM A36M steel shapes as required for strength and mullion size limitations, hot dip galvanized after fabrication in accordance with ASTM A123.

G. Metal Spandrel Panels: Manufacturer's standard laminated aluminum-faced panels of thickness indicated, flat with no deviations in plane exceeding 1.5 mm in 600 mm (1/16 inch in 24 inches) or 3 mm (1/8 inch) over entire panel. Provide with edge flanges:

1. Face Sheets: 0.6 mm (0.024-inch) minimum thickness finished to match system framing.
   a. Texture: to match existing, if applicable .
2. Concealed Back Sheets: Aluminum or galvanized steel in manufacturer's standard thickness.

I. Panel Core Material:

1. Extruded-polystyrene thermal insulation, as recommended by manufacturer, complying with ASTM C578, Type IV requirements: R-Value: R11

2.4 PROTECTION

A. Provide protection for aluminum against galvanic action, wherever dissimilar materials are in contact, by painting contact surfaces of dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one side.

2.5 METAL FINISH

A. In accordance with NAAMM AMP 500 series.

B. Finish exposed aluminum surfaces as follows to match the adjacent building (color: white):

1. Anodized Aluminum:
   a. Finish in accordance with AMP 501 letters and numbers.
   c. Colored anodized Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick.
      1) Dyes not accepted.
      2) Coated Aluminum:

3) Variation of more than 50 percent of maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.
   a) AMP 501 and 505.
   b) Fluorocarbon Finish: AAMA 2605, superior performing organic coating.

C. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 610. Primed with iron oxide paint.

D. Apply one coat 2 coats of bituminous paint to concealed aluminum and steel surfaces 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 shall receive a protective coating of asphaltic paint for prevention of electrolytic action and corrosion.

3.3 INSTALLATION

A. Installation and erection of glazed curtain wall system and all components shall be 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 3600 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 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: Shall be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
   2. Surfaces to be primed and sealed shall 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 shall 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 shall 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 shall be uniformly smooth and free of wrinkles and, unless indicated otherwise, shall 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 hours, but at no time shall 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 caulking 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 or specified. 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 approved solvent. Upon completion of caulking and sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

K. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawing 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. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer. All sashes shall be designed for outside glazing. Provide continuous snap in glazing beads to suit glass as specified.
4. Insulating and tempered glass, and glass of other types that exceed 100 united inches in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant. Perimeter frames and ventilator sections shall have glazing rebates providing an unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.

5. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Weeping of lock-strip gaskets should be in accordance with recommendation of glass manufacturer.

L. 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 contract drawings. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

3.4 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.

3.5 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 Contracting Officer for approval.

B. Conduct field check test for water leakage on designated wall areas after erection to comply with MCWM-1. Conduct test on two wall areas, two bays wide by two stories high where directed. Conduct test and take necessary remedial action as directed by Contracting Officer.

C. Test Specimen:

1. Test specimen shall include curtain wall assembly and construction. Test chamber shall be affixed to exterior side of test specimen and test shall be conducted using positive static air pressure.

2. Test specimens shall be selected by Contracting Officer after curtain wall system has been installed in accordance with contract drawings and specification.

D. Sealant Adhesion Tests: Test installed sealant, in presence of sealant manufacturer's field representative, in a minimum of two areas and as follows:
   1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
   2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

E. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783.
   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 shall 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 shall be recorded, and same modifications and repairs made to all system and adjacent construction on project.
   4. Should second test fail, Contracting Officer 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 shall be cause for rejection of wall system and adjacent construction on project.

3.6 DEMONSTRATION, TESTING, AND ACCEPTANCE

A. Instruct Owner's personnel in proper operation and maintenance of revolving entrance door equipment or horizontal sliding entrance door equipment. 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, revolving entrance door equipment or horizontal sliding entrance door equipment and systems shall be operated for a period of fifteen (15) consecutive calendar days without breakdown.

3.7 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 shall 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.

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SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Aluminum windows of type and size shown, complete with hardware, related components and accessories provided by VA installed by GC.

B. Types:

1. Fixed – Large Missile Impact type.

1.2 DEFINITIONS

A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, and other necessary components required for fabrication and installation of window units.

B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

1.3 RELATED WORK

A. Steel subframes: Section 05 50 00, METAL FABRICATIONS.

B. Storefront: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

C. Glazing: Section 08 80 00, GLAZING.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect windows from damage during handling and construction operations before, during and after installation.

B. Store windows under cover, setting upright.

C. Do not stack windows flat.

D. Do not lay building materials or equipment on windows.

1.5 QUALITY ASSURANCE

A. Approval by contracting officer is required of products or service of proposed manufacturers and installers.

B. Approval will be based on submission of certification by Contractor that:

1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.

C. Provide each type of window produced from one source of manufacture.

D. Quality Certified Labels or certificate:

1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.
2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA 101/I.S.2 for type of window specified.

1.6 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:
   1. Minimum of 1/2 full scale types of windows on project.

C. Manufacturer's Literature and Data:
   1. Window.

D. Certificates:
   1. Certificates as specified in paragraph QUALITY ASSURANCE.
   2. Indicating installers qualifications.

1.7 WARRANTY

Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article "WARRANTY OF CONSTRUCTION", FAR clause 52.246-21, except provide 10 year warranty period.

1.8 APPLICABLE PUBLICATIONS

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

B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
   90.1-04.....Energy Standard of Buildings

C. American Architectural Manufacturers Association (AAMA):
   101/I.S.2/A440-05.....Windows, Doors, and Unit Skylights
   505-98.....Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures
   2605-05.....Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels

TIR-A8-04.....Structural Performance of Poured and Debridged Framing Systems

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

A653/A653M-08.....Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process

E 90-04.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. National Fenestration Rating Council (NFRC):

NFRC 100-2004 (E1a6)....Determining Fenestration Product U-Factors

NFRC 200-2004 (E1a4)....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

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

AMP 500-06.....Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

A. VA to provide Large Missile Impact Fixed window units for the GC to install. In the event of damage occurring construction. GC to provide new window assembly in kind. Refer to VA COTR for specific equipment information.

B. Weather-strips: AAMA 101/I.S.2; except leaf type weather-stripping is not permitted.

C. Fasteners: AAMA 101/I.S.2. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.

1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS): AAMA 101/I.S.2.

3.2 INSTALLATION, GENERAL

A. Install window units as required to meet wind load requirements and in accordance with manufacturer's specifications and recommendations for

installation of window units, hardware, operators and other components of work.

B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.
   1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
   2. Sized and spaced to resist the tensile and shear loads imposed.
   3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.
   4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
   5. Locate fasteners to not disturb the thermal break construction of windows.

C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.

D. Anchor windows on four sides with anchor clips or fin trim.
   1. Do not allow anchor clips to bridge thermal breaks.
   2. Use separate clips for each side of thermal breaks.
   3. Make connections to allow for thermal and other movements.
   4. Do not allow building load to bear on windows.
   5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
   6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.

E. Sills and Stools:
   1. Set in bed of mortar or other compound to fully support, true to line shown.
   2. Do not extend sill to inside window surface or past thermal break.
   3. Leave space for sealants at ends and to window frame unless shown otherwise.

3.3 MULLIONS CLOSURES, TRIM, AND PANNING

A. Cut mullion full height of opening and anchor directly to window frame on each side.

B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.

C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.

D. Toggle bolt to hollow masonry units. Screwed to wood or metal.

E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.

F. Seal units following installation to provide weathertight system.

3.4 ADJUST AND CLEAN

A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.

B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.

C. Remove excess glazing and sealant compounds, dirt, and other substances.

D. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors to match existing system.

B. VA has specific preference in the type of locks to ensure consistency with the existing lock system. Coordinate with VA Project Manager for requirements.

C. All door hardware shall be ADA compliant.

1.2 RELATED WORK

A. Application of Hardware: Section 08 14 00, WOOD DOORS; Section 08 11 13, HOLLOW METAL DOOR FRAMES.

B. Painting: Section 09 91 00, PAINTING.

C. Lead Lined Doors & frames: Section 13 49 00, RADIATION PROTECTION

D. Low Energy Power Assist Door Operators: Section 08 71 13.11 LOW ENERGY POWER ASSIST DOOR OPERATORS

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. 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.

C. Deadlocks specified for psychiatric area doors are not required to have "UL" label.

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, if possible, except as otherwise specified:

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.

3. Surface applied overhead door closers.
4. Exit devices.
5. Floor closers.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

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.

1.5 DELIVERY AND MARKING

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.

1.6 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 "HW" followed by a number. Each number designates a set of hardware items applicable to a door type.

B. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Adams-Rite	Adams Rite Mfg. Co.	Glendale, CA
Glynn Johnson	Glynn Johnson Co.	Chicago, IL
LCN	LCN Closers	Princeton, IL
Firemark	Rixon-Firemark Co.	Chicago, IL
Hager	Hager Hinge Company	Saint Louis, MO
Stanley	The Stanley Works	New Britain, CT
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA
Unican	Simplex Security Systems	Collinsville, CT
Von Duprin	Von Duprin Hardware Co.	Indianapolis, IN
Zero	Zero Weather Stripping Co.	New York, NY

C. Keying: Keying information shall be furnished at a later date by the Resident Engineer.

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. 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

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-00.....Butts and Hinges
A156.2-03.....Bored and Pre-assembled Locks and Latches
A156.3-01.....Exit Devices
A156.4-00.....Door Controls (Closers)
A156.5-01.....Auxiliary Locks and Associated Products
A156.6-05.....Architectural Door Trim
A156.8-05.....Door Controls-Overhead Stops and Holders
A156.13-05.....Mortise Locks and Latches Series 1000
A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical
A156.16-02.....American National Standard for Auxiliary Hardware
A156.18-06.....Materials and Finishes
A156.21-06.....Thresholds
A156.22-03.....Door Gasketing and Edge Seal Systems
A156.23-04.....Electromagnetic Locks
A156.24-03.....Delayed Egress Locking Systems
A156.26-06.....Continuous Hinges
A156.31-01 .....American National Standard for Electric Strikes and Frame Mounted Actuators
A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):

80-07.....Fire Doors and Fire Windows
101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2007)

PART 2 – PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Interior Doors: Type 8112 for doors 900 mm (3 feet) wide or less and Type A8111 for doors over 900 mm (3 feet) wide.
2. Any door installed in structural steel frames: Type A2412, A8412, A2411 or A8411 as applicable, except where otherwise specified. Such

hinges shall be of same quality and weight as other hinges listed above for applicable door sizes.

3. Labeled Wood Fire Doors: Type 8411 or Type 8412; these hinges shall be thru bolted to door with hex nuts and bolts.

B. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.2 DOOR CLOSING DEVICES

Closing devices shall be products of one manufacturer for each type specified.

2.3 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.

B. Closers shall conform to the following:

1. The closer shall have 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: Size closers in accordance with manufacturer's recommendations or provide multi-size closers, sizes 1 through 6.
4. Material of closer shall be forged or cast aluminum.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Closers shall have full size cover.
7. Closers shall have adjustable hydraulic back-check and separate valves for closing and latching speed.

2.4 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.

D. Substitute floor stops Type L02141 or L02161 as appropriate, when wall bumpers would not provide an effective door stop.

E. Where drywall partitions occur, use floor stops, Type L02141 or L02161.

F. Provide stop Type L02011 or L02181, as applicable for exterior doors.

G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

2.5 OVERHEAD DOOR HOLDERS

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.

2.6 FLOOR DOOR HOLDERS

Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.7 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than six pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw. Provide temporary keying device or construction core of allow opening and closing during construction and prior to the installation of final cores.

B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets, except on designated doors in Psychiatric (Mental Health) areas, shall have lever handles similar to Falcon S-lever Design. Lever handle shall be fabricated from wrought stainless steel. No substitute lever design or material shall be accepted. All locks and

latchsets shall be furnished with curved lip strike and wrought box. Lock function F02 shall be furnished with key plates similar to Russwin's No. A70. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks.

2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. 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.)
3. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.5.
4. Locks on designated doors in Psychiatric (Mental Health) areas shall be paddle type with arrow projection covers and be UL Listed. Provide these locks with paddle in the down position on both sides of the door. Locks shall be fabricated of wrought stainless steel.

C. Manufacturers:
   1. MBS Locks with Falcon Cores, no substitution.

2.8 PUSH-BUTTON COMBINATION LOCKS

A. ANSI/BHMA A156.5, Grade 1. Mechanical or electrically operated as indicated.

B. Construction: Heavy duty cylindrical lock housing conforming to ANSI/BHMA A156.2, Grade 1. Lever handles and operating components in compliance with the UFAS and the ADA Accessibility Guidelines.

C. Special Features: Key override to permit a master keyed security system and a key activated passage feature to allow access without using the entry code.

D. Manufacturers:
   1. Alarm Lock.
   2. Code Locks, LLC
   3. Locknetics; an Ingersoll Rand company.
   4. Kaba Ilco.
   5. MBS Locks with Falcon cores.

2.9 KEYS

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	1 key

B. Psychiatric keys shall be cut so that first two bittings closest to the key shoulder are shallow to provide greater strength at point of greatest torque.

2.10 KEY CABINET

A. Use existing key cabinet to hold new keys. Label all new keying to match existing system as directed VA Project Manager.

2.11 ARMOR PLATES, COMBINATION KICK-MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick-mop plates and armor plates metal, Type J100 series, color as required.
2. Provide kick-mop plates for both sides of each new door, except where noted as not required. Kick-mop plates shall be 200 mm (8 inches) high. On push side of doors where jamb stop extends to floor, make combination kick-mop 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 combination kick-mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick-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) Storage side of doors to or from storage spaces; and

e) Both sides of aluminum entrance doors.

4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. 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 rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt cross bar.
5. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick-mop plate in place of armor plate. Size of stretcher plate and kick-mop plate shall be 200 mm (8 inches) high.

2.12 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 lever handles similar to locksets, unless otherwise specified.

B. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.13 FLUSH BOLTS (LEVER EXTENSION)

A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

B. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

C. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

2.14 DOOR PULLS

Conform to ANSI A156.6. Pull plate 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Cut plates of door pulls for cylinders, or turn pieces where required.

2.15 PUSH PLATES

Conform to ANSI A156.6. Plastic, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide plastic Type J300 plates 100 mm (4

inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Color shall be as specified for kick-mop plates. Cut plates for cylinders, and turn pieces where required. When wood grain plastic plates are specified, grain in plates shall run in same direction as grain of face veneer of wood doors.

2.16 COMBINATION PUSH AND PULL PLATES

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 (32 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.

2.17 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 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.

2.18 MAGNETIC HOLD OPENS

A. Provide magnetic hold opens and all required components to be VA Tampa Facility standard or as directed by VA Project Manager.

2.19 ACCESS CONTROL DEVICES, CARD READERS, & COMPONENTS

A. Provide card readers to be equal to DigiReader NexSentry by Westinghouse Security Electronics, Inc. to be compatible with the Honeywell NexKey Access Card. Provide all required components for fully operable condition to tie into existing Facility's access control system.

2.20 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 E76213, conforming to ANSI A156.5. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Cylinders for Various Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur, except as

otherwise specified. Provide cylinders to operate locking devices where specified for following partitions and doors:

1. Folding doors and partitions.
2. Wicket door (in roll-up door assemblies).
3. Slide-up doors.
4. Swing-up doors.
5. Fire-rated access doors-Engineer's key set.
6. Doors from corridor to electromagnetic shielded room.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011, of light gray color, on each steel door frame, except 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.

2.21 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS

A. Where lock is shown, equip each cabinet door (metal) with lock Type E06213, conforming to ANSI A156.1. 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.

2.22 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.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum.
5. Thresholds: Mill finish aluminum.
6. Cover plates for floor hinges and pivots: 630.

7. Other primed steel hardware: 652.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Color of Plastic Items: Where colors other than chocolate brown or black are specified, color of core material may be different than color of face.

2.23 BASE METALS

Apply specified U.S. Standard finishes on different base metals as following:

Finish	**Base Metal**
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to Resident Engineer for approval.

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 regular arm. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Substitute parallel arm or top jamb mounting for regular arm mounting where the following conditions occur:

1. Where door swing, in full open position, would be limited to less than 90 degrees due to partition construction and closer location.
2. Where door to room opens outward into corridor, except security bedroom, bathroom and anteroom doors which shall have closer installed parallel arm on exterior side of doors.
3. On doors equipped with roller latch.

C. 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)

D. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim.

E. 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.

F. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

G. 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.

H. 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 bidding 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 HARDWARE SETS

Set 1: Interior Office Door, Entrance Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plates (Push Side)

Set 1A: Interior Office Door, Entrance Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Stop
3 Silencers
2 Mop Plates

Set 1B: Interior Office Door, Automatic Door Operator, Entrance Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Card Reader
1 Electric Strike
1 Automatic Door Operator (with touchless activators- both sides)
1 Stop
3 Silencers
2 Mop Plates

Set 2: Interior Exam Room door, w/closer, Entrance Lockset

Each door to have:

2 pr. Butts
1 Lockset
1 Closer
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 2A: Interior fire rated door, w/closer, Entrance Lockset

Each door to have:

2 pr. Butts
1 Lockset
1 Rim Exit Device
1 Closer

1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 2B: Interior Fire rated door, w/card reader, automatic door operator , Entrance Lockset

Each door to have:

2 pr. Butts
1 Lockset
1 Card Reader
1 Automatic Door Operator (with touchless activators- both sides)
1 Electrified Rim Exit Device
1 Set Smoke Seals
1 Automatic Door Bottom
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 2C: Interior Smoke door, card reader, automatic door operator , Entrance Lockset

Each door to have:

2 pr. Butts
1 Lockset
1 Card Reader
1 Automatic Door Operator
1 Electrified Rim Exit Device
1 Set Smoke Seals
1 Automatic Door Bottom
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 3: Interior single door, Privacy Set, w/closer

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Closer
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 3A: Interior single door, Privacy Set, w/closer

Each door to have:

1 ½ pr. Butts
1 Lockset

1 Closer
1 Stop
2 Mop Plates

Set 4: Interior Fire Rated Door, Storage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Closer
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plate (Push Side)

Set 4A: Interior Fire Rated Door, Storage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Closer
1 Stop
3 Silencers
1 Mop Plate
1 Kick Plate

Set 4B: Interior Door, Storage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Closer
1 Stop
1 Mop Plate
1 Kick Plate

Set 4C: Interior Door, Smoke Seals, Storage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Closer
1 Stop
3 Silencers
1 Set Smoke Seals
1 Door Bottom
1 Mop Plate
1 Kick Plate

Set 4D: Interior Clean Storeroom Door, Card Reader, Storage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Electric Strike
1 Card Reader

1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plates (Push Side)

Set 5: Interior Door, Automatic Door Operator, Passage Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Electric Strike
1 Automatic Door Operator
2 Touchless Door Activators
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plates (Push Side)

Set 5A: Interior Door, Automatic Door Operator, Classroom Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Electric Strike
1 Card Reader
1 Automatic Door Operator
2 Touchless Door Activators
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plates (Push Side)

Set 5B: Interior Door, Automatic Door Operator, Classroom Lockset

Each door to have:
2 pr. Butts
1 Lockset
1 Electric Strike
1 Card Reader
1 Automatic Door Operator
2 Touchless Door Activators
1 Stop
3 Silencers
1 Mop Plates (Pull Side)
1 Door Protection Plates (Push Side)

Set 6: Interior Office Door, Smoke Seals Classroom Lockset

Each door to have:
1 ½ pr. Butts
1 Lockset
1 Closer
1 Smoke Seals
1 Stop
3 Silencers
2 Mop Plates

Set 7: Interior Fire rated Stair Door, Passage Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Closer
1 Rim Exit Device
1 Stop
1 Smoke Seals
3 Silencers
1 Mop Plate
1 Kick Plate

Set 7A: Interior Fire rated Stair Door, Card reader, Classroom Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Closer
1 Electric strike
1 Card Reader (Pull Side)
1 Rim Exit Device
1 Smoke Seals
1 Stop
3 Silencers
1 Mop Plate
1 Kick Plate

Set 7B: Exterior Stair Door, Entrance Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset
1 Closer
1 Rim Exit Device
1 Card Reader
1 Electric Strike
1 Threshold
1 Overhead Rain protector
1 Stop
3 Silencers
1 Kick Plate

Set 7C: Exterior Stair Door, Storeroom Lockset

Each door to have:

1 ½ pr. Butts
1 Lockset (Always active on exterior side)
1 Closer
1 Threshold
1 Overhead Rain protector
1 Stop
3 Silencers
1 Kick Plate

Set 8: Interior Pair Smoke Doors, Entrance lockset

Each pair to have:

3 pr. Butts
2 Locksets
2 electrified Exit devices
2 Automated Door Operators (with Touchless Activators both sides)
2 Magnetic Hold-Opens
2 Floor Stop
1 Astragal
1 Coordinator if required
1 Set Smoke Seals
2 Door Bottoms
2 Silencers
4 Door Protection Plates (Both Sides)

Set 8A: Interior Pair Smoke Doors, Storage lockset

Each pair to have:

3 pr. Butts
1 Lockset
1 Set Flush Bolts
2 Closers
2 Floor Stop
1 Astragal
1 Set Smoke Seals
2 Door Bottoms
2 Silencers
4 Door Protection Plates (Both Sides)

Set 8B: Interior Pair Doors, Storage lockset

Each pair to have:

3 pr. Butts
1 Lockset
1 Set Flush Bolts
2 Closers
2 Floor Stop
2 Silencers
4 Door Protection Plates (Both Sides)

Set 8C: Interior Pair Doors, Entrance lockset

Each pair to have:

3 pr. Butts
2 Locksets
2 Electrified Exit Devices
2 Automated Door Operators (with Touchless Activators both sides)
2 Floor Stop
1 Coordinator if required
2 Silencers
4 Door Protection Plates (Both Sides)

Set 9: Interior automatic biparting door

Each pair to have:

2 Touchless Door Activators
Balance of Hardware to be provided by door manufacturer.

Set 10: Interior Door, Delayed Egress Exit Device, less exterior leverset

Each pair to have:

2 pr. Butts
1 Lockset(Less Exterior Hardware)
1 Delayed Egress RIM Exit Device (w/ audible alarm)
1 Stop
1 Set Smoke Seals
1 Door Bottom
3 Silencers
2 Door Protection Plates (Both Sides)

Signage for Push Side "PUSH EXIT HARDWARE UNTIL ALARM SOUNDS DOOR CAN BE OPENED IN 15 SECONDS"

Signage for Pull Side "NOT AN ENTRANCE"

Set 11: Interior Uneven Pair Smoke Doors, Storage lockset

Each pair to have:

4 pr. Butts
1 Lockset
1 Set Flush Bolts (inactive leaf)
2 Closers
2 Floor Stop
1 Astragal
1 Set Smoke Seals
2 Door Bottoms
2 Silencers
4 Door Protection Plates (Both Sides)

- - - E N D - - -

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies equipment, controls and accessories for automatic operation of swing and sliding doors.

1.2 RELATED WORK

A. Door hardware; Section 08 71 00, DOOR HARDWARE.

B. Section 28 13 00, ACCESS CONTROL.

C. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

D. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

E. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.

B. One type of automatic door equipment shall be used throughout the building.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

Automatic door operators shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:

1. Showing location of controls and safety devices in relationship to each automatically operated door.

2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to Resident Engineer that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in five 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: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

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. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-1999.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
101-09.....Life Safety Code

D. Underwriters Laboratory (UL):
325-02.....Door, Drapery, Gate, Louver, and Window Operators and Systems

1.9 DELIVERY AND STORAGE

Delivery shall be in factory's original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to

exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are magnetically locked.

For existing buildings or additions to existing buildings, door operators are to be by manufacturer of existing equipment, if possible. Coordinate with VA personnel.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. A minimum 1/8 Hp "DC" shunt-wound permanent magnet motor with sealed ball bearings shall be attached to transmission system. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.

3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.

2.2 MICROPRCESSOR CONTROLS

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed:
   1. With push-to-operate function enabled, the control shall provide a means of initiating a self-start activation circuit by slightly pushing the door open at any point in the door swing.
   2. Power assist shall provide a two second impulse in the close direction to overcome restrictions with locking devices of pressure differentials, allowing the unit to operate in standard time delay mode, and permitting the door to close from the full open position after the hold time is satisfied.

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position toggle switch with functions for ON, OFF, and HOLD OPEN.

2.3 SLIDING DOOR OPERATORS

A. General: Sliding doors shall have electric operators, conforming to BHMA A156.10 and the following requirements as applicable. Assembly shall be single or bi-parting sliding doors as shown on drawings.

B. Door Operation: Doors shall be opened by electric motor pulling door from closed to open position and shall stop door by electrically reducing voltage and stalling door against mechanical stop. System

shall permit manual control of door in event of power failure. Opening and closing speeds shall be adjustable. In compliance with NFPA-101, all door panels shall allow "breakout" to the full open position to provide instant egress at any point in the door's movement.

C. Operators: Completely assembled and sealed electromechanical operating unit, all located in cast aluminum housing and filled with special lubricant for extreme conditions. Attached to transmission system shall be a minimum 1/8 Hp "DC" shunt-wound permanent magnet motor with sealed ball bearings. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement. Operators shall have adjustable opening and closing cycle. Housing shall be minimum 6063T-5 alloy aluminum not less than .005 mm (125 inch) minimum thickness, 150 mm by 200 mm (6 inch wide by 8 inch high).

D. Sliding Door Hardware Guide Rollers, Door Carrier: Top door carriers shall ride on steel or delrin rollers incorporating sealed bearings with each door having two support rollers and one anti-rise roller. Each roller shall have a minimum of 9 mm (3/8-inch) of vertical adjustment with positive mechanical locks. Each door shall also include two urethane covered oil impregnated bearing bottom rollers attached with 5 mm (3/16-inch) thick formed steel guide brackets. Each door carrier supporting a door leaf shall include a vertical steel reinforcing member to prevent sagging when door is swung under breakaway conditions. All carbon steel brackets and fittings shall be plated for corrosion resistance.

2.4 POWER UNITS

Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

2.5 DOOR CONTROLS

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

Push Plate Wall Switch: Recess type, cast aluminum or stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (l/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Knowing Act Activation:
   1. Sensor Plate: Touchless, Provide sensor switch designed for touchless activation of automatic doors.
   2. Manufacturered by Larco or approved equal.
   3. CE and FCC approved.
   4. Technology: microwave with adjustable range of 2 inches to 24 inches
   5. Operation Mode: Sense: Activate when there is a motion. Switch: Relay toggles when there is a motion.
   6. Color: Grey.
   7. Provide all additional wiring and componentry as required to connect sensor device to Door Controller for fully operable condition

2.6 SAFETY DEVICES

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device, except where push controls are shown.

B. At sliding doors, provide two photoelectric beams mounted at heights of 600 mm (24 inches) and 1200 mm (48 inches) in the door frame on sliding doors. Beams shall parallel door openings to prevent doors from closing when anyone is in the center of the door or doors. When beams are activated, doors shall recycle to full open position. Actuation shall include a motion detector mounted on each side of the door for detection of traffic in each direction.

C. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

D. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

E. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.

B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type o£ traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

3.2 INSTRUCTIONS

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 2 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.

B. Coordinate instruction to VA personnel with Resident Engineer.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

B. Refer to drawings for types and locations.

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. Lead glass: Section 13 49 00, RADIATION PROTECTION.
4. Section 08 44 13, GLAZED ALUMINUM 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 (National Fenestration Rating Council) label requirements.
3. Temporary labels shall remain intact until glass is approved by Resident Engineer.

B. Permanent labels:

1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
   a. Tempered glass.
   b. Laminated glass or have certificate for panes without permanent label.
   c. Organic coated glass.

1.4 PERFORMANCE REQUIREMENTS

A. 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.

B. Glass Thickness:
   1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7 and applicable codes.
   2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   3. Test in accordance with ASTM E 330.
   4. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Certificates:
   1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
   2. Certificate on shading coefficient.
   3. Certificate on "R" value when value is specified.

C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to "Warranty of Construction" Article in this Section.

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: 150 mm by 150 mm (6 inches by 6 inches).
   2. Tinted glass.
   3. Reflective glass.

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.

1.7 PROJECT CONDITIONS

Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:

1. Insulating glass units to remain sealed for 10 years.
2. Laminated glass units to remain laminated for 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 National Standards Institute (ANSI):

Z97.1-2004.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

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

C1363-05.....Thermal Performance of Building Assemblies, by Means of A Hot Box Apparatus

C542-05.....Lock-Strip Gaskets.

C716-06.....Installing Lock-Strip Gaskets and Infill Glazing Materials.

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C920-08.....Elastomeric Joint Sealants.

C1036-06.....Flat Glass.

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C1172-03.....Laminated Architectural Flat Glass.

C1349-04.....Architectural Flat Glass Clad Polycarbonate.

D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position.

D4802-08.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet.

E84-08.....Surface Burning Characteristics of Building Materials.

E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

E774-97.....Sealed Insulating Glass Units

D. Commercial Item Description (CID):

A-A-59502.....Plastic Sheet, Polycarbonate

E. Code of Federal Regulations (CFR):

16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 1977, with 1984 Revision.

F. National Fire Protection Association (NFPA):

80-2007.....Fire Doors and Windows.

G. National Fenestration Rating Council (NFRC):

Certified Products Directory (Latest Edition).

H. Safety Glazing Certification Council (SGCC):

Certified Products Directory (Issued Semi-Annually).

I. Underwriters Laboratories, Inc. (UL):

752-2005.....Bullet-Resisting Equipment.

PART 2 - PRODUCT

2.1 GLASS

A. Use thickness stated unless specified otherwise in assemblies.

B. Clear Glass:

1. ASTM C1036, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch) or as indicated.

3. Coordinate color/tint/coating to accommodate required security monitoring.

C. Tinted Heat reflective and low emissivity coated glass:

1. ASTM C1036, Type I, Class 2, Quality q3.

2. Color: to be selected.
3. Thickness,6 mm (1/4 inch), or as indicated.

D. Patterned and Wired Flat Glass:
1. ASTM C1036, Type II, Class 1,Form 1, Pattern Pl, Finish F1, Quality m1.
2. Thickness, 6 mm (1/4 inch), or as indicated.

2.2 HEAT-TREATED GLASS

A. Clear Heat Strengthened Glass:
1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch), or as indicated.

B. Tinted Heat Strengthened Glass: Exterior
1. ASTM C1048, Kind HS, Condition A, Type I, Class 2, Quality q3.
2. Color: to match existing adjacent building.
3. Thickness, 6 mm (1/4 inch), or as indicated.

C. Clear Tempered Glass:
1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch), or as indicated.

D. Tinted Tempered Glass.
1. ASTM C1048, Kind FT, Condition A, Type I, Class 2, Quality q3.
2. Color: to be selected.
3. Thickness, 6 mm (1/4 inch), or as indicated.

E. Tempered Patterned Glass (obscure):
1. ASTM C1048, Kind FT, Type II, Class 1, Form 3, Quality q8, Finish f1, Pattern p3.
2. Thickness: 10.7 mm (0.422 inch), or as indicated.

2.3 COATED GLASS

A. Spandrel Glass:
1. ASTM C1048, Kind HS, Condition B, Type I.
2. Thickness, 6 mm (1/4 inch), or as indicated.

B. Reflective Tempered Glass:
1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with reflective metallic coating, having nominal values of 25 percent day light, 30 percent solar, and 7.9 percent ultraviolet transmittance within three percent plus or minus.
2. Thickness, 6 mm (1/4 inch), or as indicated.

C. Low-E Tempered Glass:
   1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.
   2. Apply coating to third surface of insulating glass units.
   3. Thickness, 4.8 mm (3/16 inch), or as indicated.

D. Organic Coated Glass:
   1. Optional for tempered, heat strengthened, or laminated glass.
   2. Polyester coated to obtain safety glazing ANSI Z97.1 and SGCC label.
   3. Applied to glass.

E. Transparent Mirror (One-Way-Vision Glass):
   1. ASTM C1036, Type I, Class 1, Quality q2 or Class 3, Quality q3; Grey Glass.
   2. Thickness, 6 mm (1/4 inch), or as indicated.
   3. Coated one face with a hard adherent reflective film of chromium or other coating of proven equivalent durability.
   4. Visible light transmittance; eight percent, plus or minus two percent.
   5. Visible reflectance; sixty percent, plus or minus five percent.
   6. Light ratio; mirror side 10 or more; observer side one or less.
   7. Assemble with coating covered and protected with a layer of clear glass not less than 3 mm (1/8 inch) thick.
   8. Clean interface glass prior to assembly.
   9. Tape edge to seal interface and hold panes together.

2.4 INSULATING GLASS UNITS

A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space.

B. Assemble units using glass types specified.

C. Sealed Edge Units (SEU):
   1. Conform to ASTM E774, Class C performance requirements.
   2. Air Space not less than 13 mm (½ inch) wide.
   3. R value not less than 1.65.

D. SEU Clear Glass:
   1. Exterior pane Clear Glass 6 mm (1/4 inch) thick.
   2. Interior pane Clear Glass 6 mm (1/4 inch) thick.

E. SEU Clear Tempered Glass:
   1. Exterior pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, low-E coating on second surface, 6 mm (1/4 inch) thick.

2. Interior pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, 6 mm (1/4 inch) thick.

G. SEU Clear Tempered and Laminated Glass for overhead glazing condition.
1. Exterior Pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, 6 mm (1/4 inch) thickness.
2. Interior pane laminated of ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3. Thickness: Each pane 4.8 mm (3/16 inch) thick as indicated.

H. Fused Edge Units, (FEU):
1. Glass to glass sealed edges electrically fused.
2. Air space not less than 4.8 mm (3/16 inch) wide up to 6 mm (1/4 inch) wide.
3. R value not less than 1.5.

I. FEU Clear Glass.
1. Interior and exterior panes, ASTM C1036, Type I, Class 1, Quality q3, 3 mm (1/8 inch) thick.
2. Thickness, 11 mm (7/16 inch) minimum.

2.5 GLAZING ACCESSORIES

A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.

B. Setting Blocks: ASTM C864:
1. Channel shape; having 6 mm (1/4 inch) internal depth.
2. Shore a hardness of 80 to 90 Durometer.
3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
5. 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: One to 25 to 76 mm (one to three inches).
4. Shore a hardness of 40 to 50 Durometer.

D. Sealing Tapes:
   1. Semi-solid polymeric based 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.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbeted sash without stops.

G. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond shaped pieces, 6 mm (1/4 inch) minimum size.

H. Glazing Gaskets: ASTM C864:
   1. Firm dense wedge shape for locking in sash.
   2. Soft, closed cell with locking key for sash key.
   3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

I. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated. Use black only.

J. Glazing Sealants: ASTM C920, silicone neutral cure:
   1. Type S.
   2. Class 25
   3. Grade NS.
   4. Shore A hardness of 25 to 30 Durometer.

K. Structural Sealant: ASTM C920, silicone acetoxy cure:
   1. Type S.
   2. Class 25.
   3. Grade NS.
   4. Shore a hardness of 25 to 30 Durometer.

L. Color:
   1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall 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 shall be black, gray, or neutral color.

M. 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's approved shop drawings.
B. Advise Contractor of 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 to prevent damage to glass and glazing units by cleaning materials.

3.2 PREPARATION

A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 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-01 Glazing Manual and GANA-02 Sealant Manual 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 shall 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 Resistant Glass:

1. Wire glass: Glaze in accordance with NFPA 80.
2. Other fire resistant glass: Glaze in accordance with UL design requirements.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape, spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Trim protruding tape edge.

3.5 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 150 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 _____ type sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line.

G. Apply cap bead of _____ type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 INSTALLATION - WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glazing pane or unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

C. Fill gaps between glazing and stops with _____ type sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 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 _____ type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.8 INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND)

A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 600 mm (24 inch) centers, kept 6 mm (1/4 inch) below sight line.

B. Locate and secure glazing pane using glazers' spring wire clips.

C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.9 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.

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.

3.10 PROTECTION

Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.11 GLAZING SCHEDULE

A. Fire Resistant Glass:

1. Install clear wire glass in interior fire rated or labeled doors and windows.
2. Install clear wire glass in exterior windows and doors indicated to receive wire glass.
3. Install patterned (obscure) wire glass in bath, toilet, and locker room windows, except where indicated to receive clear wire glass.
4. Use Fire Resistant Glass without wire mesh in special area only. Consult with VA Project Manager.

B. Tempered Glass:

1. Install in full and half glazed doors unless indicated otherwise.
2. Install in storefront, windows, and door sidelights adjacent to doors.
3. Use clear tempered glass on interior side lights and doors, and on exterior doors and sidelights unless otherwise indicated or specified.

4. Use SEU clear tempered insulating glass on storefronts and sidelights.
5. Use SEU tinted tempered and clear tempered insulating glass on storefront and sidelights.
6. Use SEU Low E tempered and clear glass, G-41, on storefront and sidelights.
7. Use SEU reflective tempered and clear tempered glass on storefront and sidelights.
8. Use tinted tempered glass in exterior pane and clear tempered glass in interior pane unless specified otherwise of insulating glass units adjacent to door.
9. Use clear tempered glass in exterior and interior panes unless specified otherwise at insulating glass units adjacent to door.

C. Clear Glass:
1. Interior observation windows not specified otherwise.
2. Interior pane of dual glazed windows not receiving tempered, laminated or organic coated glass, or other special glass indicated or specified.

D. Tinted Glass: Exterior pane of dual glazed windows not receiving tinted tempered glass.

E. Insulating Glass:
1. Install SEU clear tempered glass in windows, interior pane of dual glazed windows, storefronts, curtain walls, adjacent to entrances or walks.
2. Install SEU clear glass in windows, interior pane of dual glazed windows, storefronts, curtain walls, not adjacent to entrances or walks.
3. Install SEU tinted tempered and clear tempered glass in storefronts, curtain walls adjacent to entrances or walks.
4. Install SEU tinted tempered and laminated glass in skylights and other overhead conditions.

F. Pattern Glass (obscure):
1. Install in interior pane of dual glazed windows of toilets, baths, and locker rooms and where indicated.
2. Pattern Glass (obscure), unless specified otherwise.
3. Fire Rated Doors: Use patterned (obscure) wire glass.
4. Other Doors: Use tempered patterned glass.

G. Spandrel Glass: Install specified spandrel glazing where indicated.

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

Provide acoustical insulation in all new walls and as indicated in drawings.

1.2 RELATED WORK

A. 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.

B. Section 13 49 00, RADIATION PROTECTION

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)

A123-08.....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A653/A653M-08.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A641/A641M-03.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C635/C635M-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636/C636M-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-07.....Non-Structural Steel Framing Members

C754-07.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03 (2008)e1.....Installation of Interior Lathing and Furring

C954-07.....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

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E580/E580M-08.....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 G-60 minimum, per ASTM 123.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes and shown.
   1. Use ASTM A525 steel, 0.9 mm (0.0359-inch) thick bare metal (20 gauge).
   2. Runners same thickness as studs.

B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.

C. Doubled studs for openings and studs for supporting concrete backer-board.

D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

E. Shaft Wall Framing:
   1. Conform to rated wall construction.
   2. C-H Studs.
   3. E Studs.
   4. J Runners.
   5. Steel Jamb-Strut.

2.3 FURRING CHANNELS

A. Rigid furring channels (hat shape): ASTM C645.

B. Resilient furring channels:
   1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
   2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.

C. "Z" Furring Channels:
   1. Not less than 0.45 mm (0.0179-inch)-thick bare metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
   2. Web furring depth to suit thickness of insulation with slotted perforations.

D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. For fire rated construction: Type and size same as used in fire rating test.

C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.

F. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

G. Attachments for Wall Furring:

1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.

H. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

2.6 ACOUSTICAL INSULATION:

A. Mineral Fiber boards: ASTM C553, Type II, flexible, or Type III, semirigid (4.5 pound nominal density).

B. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.

C. Thickness as shown; of widths and lengths to fit tight against framing.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 610 mm (24 inches) on center.

C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.

D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.

E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions and insulated exterior wall furring.

F. At existing plaster ceilings and where shown, studs may terminate at ceiling as shown.

G. Openings:

1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.

H. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

I. Chase Wall Partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).

J. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.

K. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall furring-Stud System:

1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:

1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center, horizontally or vertically.
2. Install "Z" furring channels vertically spaced not more than 600 mm (24 inches) on center.
3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.

D. Installing Wall Furring-Bracket System: Space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire

extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.

B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
   1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
   2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.

B. New exposed concrete slabs:
   1. Use metal inserts required for attachment and support of hangers or hanger wires with tied wire loops for embedding in concrete.
   2. Furnish for installation under Division 3, CONCRETE.
   3. Suspended ceilings under concrete rib construction shall have runner channels at right angles to ribs and be supported from ribs with hangers at ends and at 1200 mm (48-inch) maximum intervals along channels. Stagger hangers at alternate channels.

C. Concrete slabs on steel decking composite construction:
   1. Use pull down tabs when available.
   2. Use power activated fasteners when direct attachment to structural framing can not be accomplished.

D. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

E. Existing concrete construction exposed or concrete on steel decking:
   1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
   2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.

F. Steel decking without concrete topping:
   1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.
   2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.

G. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
   1. Install only for ceilings to receive screw attached gypsum board.
   2. Install in accordance with ASTM C636.
      a. Install main runners spaced 1200 mm (48 inches) on center.

b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.

c. Install wall track channel at perimeter.

H. Installing Ceiling Bracing System:

1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.

3.7 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch.)

C. Level or align ceilings within 3 mm (1/8-inch.)

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SECTION 09 24 00
PORTLAND CEMENT PLASTERING (STUCCO)

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies lathing and Portland cement based plaster (stucco).

B. Repair stucco damaged by construction.

1.2 RELATED WORK

A. Steel framing members for attachment of plaster bases: Section 05 40 00, COLD-FORMED METAL FRAMING, and Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C841, and C926 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, and bar joists.

C. Self-furring Lath: Metal plastering bases having dimples or crimps designed to hold the plane of the back of the lath 6 to 10 mm (1/4 to 3/8 inch) away from the plane of the solid backing.

D. Solid Backing or Solid Bases: Concrete, masonry, sheathing, rigid insulation, and similar materials to which plaster is directly applied.

E. Wet Areas: Areas of a building where cyclic or continuous exposure to very humid or wet conditions, or in which a dew point condition may occur in the plaster. Dew point conditions occur frequently in such areas as laundries, natatoriums, cart and dish washing spaces, hydrotherapy, kitchens, bathing or shower rooms and similar areas.

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. Accessories for plaster, each type.
2. Metal plastering bases, each type.
3. Fasteners.
4. Bonding compounds, including application instructions.
5. Admixtures, including mixing and application instructions.

C. Samples:

Accessories for plaster, each type, not less than 150 mm (6 inches) long.

Panel showing finish coat 150 by 300 mm (6 by 12 inches)minimum.

1.5 PROJECT CONDITIONS

A. Maintain work areas for interior work at a temperature of not less than 4°C (40°F) for not less than 48 hours prior to application of plaster, during application of plaster and until plaster is completely dry.

B. Exterior plaster shall not be applied when the ambient temperature is less than 4°C (40°F).

C. Plaster shall not be applied to frozen surfaces or surfaces containing frost.

D. Frozen materials shall not be used in the mix.

E. Plaster coats shall be protected against freezing for a period of not less than 24 hours after application.

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. American Society for Testing And Materials (ASTM):

A653/A653M-08.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

A641/A641M-03.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-08a.....Terminology Relating to Gypsum and Related Building Materials and Systems.

C91-05.....Masonry Cement

C150-07.....Portland Cement

C207-06.....Hydrated Lime for Masonry Purposes

C260-06.....Air Entraining Admixtures for Concrete.

C841-03 (2008)e1.....Installation of Interior Lathing and Furring

C847-06.....Metal Lath

C897-05.....Aggregate for Job-Mixed Portland Cement Based Plasters

C926-06.....Application of Portland Cement-Based Plaster

C933-07b.....Welded Wire Lath

C979-05.....Pigments for Integrally Colored Concrete

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C. Commercial Item Description (CID):

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

D. Federal Specifications (Fed Spec.):
UU-B-790A.....Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellent and Fire Resistant)

PART 2 - PRODUCTS

2.1 METAL PLASTERING BASES

A. Expanded Metal Lath:
1. ASTM C847, zinc-coated (galvanized) except as modified by ASTM C841 and this specification. Self furring where applied over solid backing.
2. Flat diamond mesh weighing not less than 1.8 kg/m^2 (3.4 pounds per square yard).
3. Stucco Mesh: Flat expanded diamond mesh pattern, with openings approximately 38 by 75 mm (1-1/2 by 3 inches), weighing not less than 1.9 kg/ m^2 (3.6 pounds per square yard), with backing as specified.

B. Wire Lath:
1. Zinc coated (Galvanized).
2. Welded Wire Lath: ASTM C933, with backing as specified.
3. Self furring where applied over solid backing.

C. Building Paper Backing for Metal Plastering Bases:
1. Backing attached to lath as specified in ASTM C933.
2. Vapor Permeable Backing: Fed. Spec. UU-B-790, Type I, Grade D.
3. Water Resistant Backing: Fed. Spec. UU-B-790, Type I, Grade B.

2.2 ACCESSORIES FOR CEMENT PLASTER (STUCCO)

A. ASTM C841, except fabricate from zinc alloy.

B. Control Joints: ASTM C841, zinc.

2.3 FASTENERS

A. Tie, wire, screws, clips, and other fasteners ASTM C841, except as otherwise specified.

B. Fasteners for securing metal plastering bases shall have heads, or be through washers large enough to engage two strands of the metal plastering base.

C. For fire rated construction; type and size as used in fire rated test.

D. Screws: ASTM C1002.

E. Expansion Shields: CID A-A-55615, of the Type and Class applicable.

2.4 CEMENT

A. Portland: ASTM C150, Type I.

B. Masonry: ASTM C91. Lime where added, ASTM C207, Type S.

C. White where required for white finish coat.

2.5 LIME

A. ASTM C206, Type S.

B. ASTM C207, Type S.

2.6 AGGREGATES (SAND)

A. ASTM C897, graded as required to suit texture of finish specified.

B. White where white finish coat is specified.

2.7 BONDING AGENT

ASTM C932.

2.8 FACTORY PREPARED FINISH COAT FOR CEMENT PLASTER (STUCCO)

A. Factory prepared dry blend of materials, integrally colored, designed for exterior finish coat application.

B. Pigments: ASTM C979, lime proof mineral oxide.

C. Not more than 35 percent, by weight of all ingredients (cement, aggregate, hydrated lime, admixture and coloring pigment) shall pass a number 100 sieve.

2.9 ADMIXTURES

Air Entrainment: ASTM C260.

PART 3 - EXECUTION

3.1 METAL PLASTERING BASES (LATH) LOCATIONS

A. Where plaster is required on solid concrete or masonry bases, metal plastering bases are not required, unless shown on the drawings. Where shown use wire lath or stucco mesh.

B. On ceiling or soffit framing use flat diamond mesh lath.

C. Where metal plastering bases are used as a base for exterior cement plaster over wall sheathing, use wire lath or stucco mesh with water resistant backing.

3.2 APPLYING METAL PLASTERING BASES

A. In accordance with ASTM C841, except as otherwise specified or shown.

B. Form true surfaces, straight or in fair curves where shown, without sags or buckles and with long dimension of lath at right angles to direction of supports.

C. Lath for ceiling or soffit construction shall terminate at casing bead (floating angle construction) at perimeter angles between walls and ceilings or soffits.

D. Lath with backing shall be applied to produce a paper to paper and metal to metal lap at ends and sides of adjacent sheets, whether full sheets or less than full sheets are used:

1. Backing shall be lapped 50 mm (2 inches) for both horizontal and vertical laps.

2. Horizontal laps shall be ship lap fashion to conduct water to the outside and over flashing or waterproofing.

E. Metal plastering bases shall not be continuous through expansion and control joints, but shall be stopped at each side.

F. Attach metal lath directly to masonry and concrete with hardened nails, power actuated drive pins or other approved fasteners. Fasteners shall be located at the dimples or crimps only.

G. Wood plugs are not acceptable.

3.3 INSTALLING PLASTERING ACCESSORIES

A. Install accessories in accordance with ASTM C841, except as otherwise specified.

1. Set plastering accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified for metal lath.
2. Install in one piece, within the limits of the longest commercially available lengths.

B. Corner Beads: Install at all vertical and horizontal external plaster corners, as required to establish grounds, and where shown.

C. Strip Lath:

1. Install metal lath strips centered over joints between dissimilar materials, such as hollow tile, brick, concrete masonry units, concrete, and joints with metal lath on framing or furring, where both such surfaces are required to be plastered and are in contact with each other in same plane, except where expansion joints and casing beads are required.
2. Wire tie or fasten strip lath to base along both edges at not over 150 mm (six inches) on centers.

D. Casing Beads:

1. Install casing beads where shown and at following locations where plaster terminates to provide finish trim.
2. Where plaster terminates against non-plastered surfaces such as masonry, concrete, and wood.
3. Where plaster terminates against trim of steel frames and trim of other materials and equipment, except where trim overlaps plaster.
4. Around perimeter of openings except where edge is covered by flanges. Locate to conform to dimensions shown on shop drawings.
5. Where plaster for new walls or furring (vertical or horizontal) terminates against existing construction.
6. Both sides of expansion and control joints unless shown otherwise.

7. Install casing bead at perimeter angles between walls and ceilings so as to provide floating angle (unrestrained) construction in accordance with ASTM C841.

E. Cornerites:
1. Install at interior corners of walls, partitions, and other vertical surfaces to be plastered, except where metal lath is carried around angle.
2. Fasten only as necessary to retain position during plastering.
3. Omit cornerites at junction of new plastered walls with existing plastered walls at locations where casing beads are specified.

F. Control Joints:
1. Where control joints are placed parallel to framing members, install joints within 100 mm (four inches) of the framing member.
2. Install control joints only to the edges of abutting sheets of lath so that the lath is not continuous or tied across the joint.
3. Joints shall extend the full width and height of the wall or length of soffit/ceiling plaster membrane.

3.4 SURFACE PREPARATION OF SOLID BASES

A. Surfaces that are to receive plaster shall be prepared and conditioned in accordance with ASTM C926, except as otherwise specified.

B. New surfaces of masonry and concrete:
1. Remove projections and clean concrete surface of form oil.
2. Fill depressions, holes, cracks and similar voids flush with Portland cement plaster to provide substrate within the tolerance specified in ASTM C926.
3. Use bonding agent.
4. Cover with self furring lath where required to keep the total plaster thickness as specified in Table 4 of ASTM C926.

C. Existing surfaces of concrete and masonry:
1. Clean surface of dirt and other foreign matter which will prevent bond.
2. Apply dash bond coat or bonding agent as specified herein.
3. Where existing surfaces have a coating such as paint or bituminous waterproofing apply metal plastering base as specified herein.

3.5 PORTLAND CEMENT BASED PLASTER

A. Provide portland cement based plaster where cement plaster (stucco) is shown and specified, and as follows:
1. Three coat work shall be used over all metal plastering bases, with or without solid backing.
2. Two coat work may only be used over solid bases meeting the requirements of Paragraph, SURFACE PREPARATION OF SOLID BASES.

B. Proportion, mix and apply plaster in accordance with ASTM C926, except as otherwise specified.
   1. Use air entrained plaster for all exterior work.
   2. Use coloring pigments for finish coat when integral color other than white is specified.
   3. Use white cement with white sand when white finish coat is specified.
   4. Factory prepared finish coat: Add water, mix, and apply as specified by manufacturer.
   5. Color:
      a. Color of finish coat shall be natural cement color to match existing.
   6. Finish coat shall be to match existing texture.

3.6 UNACCESSIBLE CEILINGS

At Mental Health and Behavioral Nursing Units, areas accessible to patients and not continuously observable by staff (e.g., patient bedrooms, day rooms), ceilings should be a solid material such as portland cement plaster. This will limit patient access. Access doors are needed to access electrical and mechanical equipment above the ceiling. These doors should be locked to prevent unauthorized access and secured to ceiling using tamper resistant fasteners.

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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. UNIT MASONRY: Section 04 20 00

B. Sound deadening board: Section 07 21 13, THERMAL INSULATION.

C. EXTERIOR INSULATION AND FINISH SYSTEMS: Section 07 24 00

D. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

E. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

F. Gypsum base for veneer plaster: Section 09 26 00, VENEER PLASTERING.

G. Lay in gypsum board ceiling panels: Section 09 51 00, ACOUSTICAL CEILING.

H. Lead lined wallboard: Section 13 49 00, RADIATION PROTECTION.

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. Corner-bead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical shaft wall assembly.

4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

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):

C11-08c.....Terminology Relating to Gypsum and Related Building Materials and Systems
C475/C475M-02 (2007)....Joint Compound and Joint Tape for Finishing Gypsum Board
C840-08.....Application and Finishing of Gypsum Board
C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness
C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base
C1177/C1177M-08.....Glass Mat Gypsum Substrate for Use as Sheathing
C1396/C1396M-06a.....Gypsum Board
E84-08.....Surface Burning Characteristics of Building Materials
E497-99.....Installing Sound Isolating Lightweight Partitions

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. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.

C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.

D. Gypsum cores shall contain a minimum of 95 percent post industrial recycled gypsum content. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 GYPSUM SHEATHING BOARD

A. ASTM C1177, Type X, 12mm (½ inch) thick x 4'-0" wide. Fiberglass mat gypsum, mold-resistant (under ASTM D3273) and moisture resistant construction material.

2.3 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet.

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 (FHP).
      e. Corridor partitions if the building is not sprinklered.
   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. Use gypsum boards in maximum practical lengths to minimize number of end joints.

D. Bring gypsum board into contact, but do not force into place.

E. Ceilings:
   1. For single-ply construction, use perpendicular application.
   2. For two-ply assembles:
      a. Use perpendicular application.
      b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

F. Walls (Except Shaft Walls):

1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Installing Two Layer Assembly Over Sound Deadening Board:
   a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
   b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.
9. Control Joints ASTM C840 and as follows:
   a. Locate at both side jambs of openings 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.

G. 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. Follow ASTM E497 for sound rated partitions. STC minimum values as shown.

H. 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 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.
E. Seal all joints of sheathing with joint seal tape. Center tape over joints so that a minimum of 2-1/2" bonds with each side of joint.

3.4 CAVITY SHAFT WALL

A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
B. Conform to UL Design for fire rated assemblies.
C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.

1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
2. Stagger joints top and bottom in adjacent panels.
3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.

D. Gypsum Board:
1. Two hour wall:
   a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.
   b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.
   c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.
3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.

E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

F. Elevator Shafts:
1. Protrusions including fasteners other than flange of shaft wall framing system or offsets from vertical alignments more than 3 mm (1/8-inch) are not permitted unless shown.
2. Align shaft walls for plumb vertical flush alignment from top to bottom of shaft.

3.5 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 5 finish for al finished areas open to public view.

B. Before proceeding with installation of finishing materials, assure the following:
1. Gypsum board is fastened and held close to framing or furring.
2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated 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, or fire rated, or sound rated construction.

3.6 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction, and/or fire protection equivalent to the fire rated construction, and STC equivalent to the sound rated construction.

3.7 UNACCESSIBLE CEILINGS

At Mental Health and Behavioral Nursing Units, areas accessible to patients and not continuously observable by staff (e.g., patient bedrooms, day rooms), ceilings should be a solid material such as gypsum board. This will limit patient access. Access doors are needed to access electrical and mechanical equipment above the ceiling. These doors should be locked to prevent unauthorized access and secured to ceiling using tamper resistant fasteners.

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SECTION 09 30 13
CERAMIC TILING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies ceramic and porcelain tile, marble thresholds, terrazzo divider strips, waterproofing membranes for thin-set applications, crack isolation membranes, tile backer board.

1.2 RELATED WORK

A. Preformed sealant joints in tile flooring: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

B. Color, texture and pattern of field tile and trim shapes, size of field tile, trim shapes, and color of grout specified: Refer to Drawings.

C. Plastering: Section 09 24 00, PORTLAND CEMENT PLASTERING.

D. Metal and resilient edge strips at joints with new resilient flooring, and carpeting; Section 09 65 19, RESILIENT TILE FLOORING;

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Base tile, each type, each color, each size.
2. Mosaic floor tile panels, 225 mm by 225 mm (9 inches by 9 inches), each type, color, size and pattern.
3. Porcelain tile, each type, color, patterns and size.
4. Wall (or wainscot) tile, each color, size and pattern.
5. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.

C. Product Data:

1. Ceramic and Porcelain tile, marked to show each type, size, and shape required.
2. Cementitious backer unit.
3. Divider strip.
4. Reinforcing tape.
5. Leveling compound.
6. Latex-Portland cement mortar and grout.
7. Organic adhesive.
8. White One-flex adhesive
9. Slip resistant tile.

D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
   a. Latex-Portland cement mortar and grout.
   b. Leveling compound.
   c. Organic adhesive.
   d. White one-flex adhesive.
   e. Waterproof isolation membrane.
   F. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.

1.4 DELIVERY AND STORAGE

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.

B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

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

B. American National Standards Institute (ANSI):

A10.20-06.....Safety Requirements for Ceramic Tile, Terrazzo, and Marble Works

A108.1A-05.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar

A108.1B-05.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar

A108.1C-05.....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

A108.4-05.....Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesives

A108.5-05.....Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar

A108.6-05.....Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy
A108.8-05.....Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout
A108.10-05.....Installation of Grout in Tilework
A108.11-05.....Interior Installation of Cementitious Backer Units
A108.13-05.....Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
A118.1-05.....Dry-Set Portland Cement Mortar
A118.3-05.....Chemical Resistant, Water Cleanable Tile-Setting Epoxy and Water Cleanable Tile-Setting and Grouting Epoxy Adhesive
A118.4-05.....Latex-Portland Cement Mortar
A118.5-05.....Chemical Resistant Furan Mortars and Grouts for Tile Installation
A118.6-05.....Standard Cement Grouts for Tile Installation
A118.9-05.....Cementitious Backer Units
A118.10-05.....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation
A136.1-05.....Organic Adhesives for Installation of Ceramic Tile
A137.1-88.....Ceramic Tile

C. American Society For Testing And Materials (ASTM):
A185/A185M-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcing
C109/C109M-07e1.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)
C241-90 (2005).....Abrasion Resistance of Stone Subjected to Foot Traffic
C348-02.....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C627-93(R2007).....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
C954-07.....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

C979-05.....Pigments for Integrally Colored Concrete

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Panel Products

C1027-99(2004).....Determining "Visible Abrasion Resistance on Glazed Ceramic Tile"

C1028-07.....Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method

C1127-01.....Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface

C1178/C1178M-08.....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

D4397-08.....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

D5109-99(2004).....Standard Test Methods for Copper-Clad Thermosetting Laminates for Printed Wiring Boards

D. Marble Institute of America (MIA): Design Manual III-2007

E. Tile Council of America, Inc. (TCA):

2007.....Handbook for Ceramic Tile Installation

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 C 1027.
   c. Class IV, 6000 revolution.
3. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
4. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
5. 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 petroleum paraffin wax, applied hot.
b. Do not coat unexposed tile surfaces.
c. Pre-wax tiles set or grouted with furan or epoxy or latex modified mortars.

B. Unglazed Ceramic Mosaic Tile: Nominal 6 mm (1/4 inch) thick with cushion edges.
C. Unglazed Quarry Tile: Nominal 13 mm (1/2 inch) thick, square edges.
D. Glazed Wall Tile: Cushion edges, glazing, as specified in drawings.
E. Trim Shapes:
1. Conform to applicable requirements of adjoining floor and wall tile.
2. Use slip resistant trim shapes for horizontal surfaces of showers, congregate baths, natatorium, hydrotherapy, therapeutic pool, overflow ledges, recessed steps, shower curbs, drying area curbs, and seats.
3. Use trim shapes sizes conforming to size of adjoining field wall tile including existing spaces unless detailed or specified otherwise in drawings.
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.

j. For quarry tile work, use cove and bullnose shapes as applicable.
k. Provide cove and bullnose shapes for countertops, saddles, where shown, and required to complete tile work.

2.2 CEMENTITIOUS BACKER UNITS

A. Use in wet areas on all surfaces behind tile.
B. ANSI A118.9.
C. Use Cementitious backer units in maximum available lengths.
D. Backer unit meet or exceed the following additional physical properties:

Property	Test Method	Value
Water absorption	ASTM C948	Less than 20 percent by weight

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 A118.4.
C. Joint material, including reinforcing tape, and tape embedding material, shall 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 GLASS MAT WATER RESISTANT GYPSUM BACKER BOARD

Conform to ASTM C1178/C1178M, Optional System for Cementious Backer Units.

2.6 SETTING MATERIALS OR BOND COATS

A. Conform to TCA Handbook for Ceramic Tile Installation.
B. Portland Cement Mortar: ANSI A108.1.
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 A118.4.
E. Organic Adhesives: ANSI A136.1, Type 1.
F. Chemical-Resistant Bond Coat:
   1. Epoxy Resin Type: ANSI A118.3.
   2. Furan Resin Type: ANSI A118.5.

2.7 GROUTING MATERIALS

A. Coloring Pigments:
   1. Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
   2. Add coloring pigments to grout by the manufacturer.
   3. Job colored grout is not acceptable.
   4. Use is required in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.
B. White Portland Cement Grout:
   1. ANSI A118.6.
   2. Use one part white Portland cement to one part white sand passing a number 30 screen.
   3. Color additive not permitted.
C. Latex-Portland Cement Grout: ANSI A118.6 color as specified.
   1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.
   2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

2.8 PATCHING AND LEVELING COMPOUND

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
B. Shall have minimum following 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).
C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four 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.

2.9 METAL DIVIDER STRIPS

A. Terrazzo type divider strips.
B. Heavy top type strip with 5 mm (3/16 inch) wide top and 38 mm (1-1/2 inch) long leg.

C. Embedded leg perforated and deformed for keying to mortar.
D. Aluminum or otherwise as specified in Architectural Drawings.

2.10 WATER

Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.11 CLEANING COMPOUNDS

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
B. Materials containing acid or caustic material not acceptable.

2.12 POLYETHYLENE SHEET

A. Polyethylene sheet conforming to ASTM D4397.
B. Nominal thickness: 0.15 mm (six mils).
C. Use sheet width to minimize joints.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three 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 fourth 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 1 in 500 (1/4 inch in 10 feet) from required elevation where Portland cement mortar setting bed is used.
   2. Not more than 1 in 1000 (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 1 in 400 (1/4 inch in eight feet) from required plane where Portland cement mortar setting bed is used.

2. Not more than 1 in 800 (1/8 inch in eight 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.
      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.
   2. Install mortar bed in depressed slab sloped to drains not less than 1 in 200 (1/16 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 days. Do not use curing compounds or coatings.

D. 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.

E. Walls:
1. In showers or other wet areas cover studs with polyethylene sheet.
2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
4. Apply metal lath to framing in accordance with ANSI A108.1:
   a. Use fasteners specified in paragraph "Fasteners." Use washers when lath opening is larger than screw head.
   b. Apply scratch and leveling coats to metal lath in accordance with ANSI A108.1.C.
   c. Total thickness of scratch and leveling coats:
      1) Apply 9 mm to 16 mm (3/8 inch to 5/8 inch) thick over solid backing.
      2) 16 mm to 19 mm (5/8 to 3/4 inch) thick on metal lath over studs.
      3) Where wainscots are required to finish flush with wall surface above, adjust thickness required for flush finish.
   d. Apply scratch and leveling coats more than 19 mm (3/4 inch) thick in two coats.

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 A108.11 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 200 mm (eight 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 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 GLASS MAT WATER-RESISTANT GYPSUM BACKER BOARD

A. Install in accordance with manufacturer's instructions. TCA Systems W245-01.

B. Treat joints with tape and latex-Portland cement mortar or adhesive.

3.6 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.

B. Set divider strip in mortar bed to line and level centered under doors or in openings.

C. At preformed sealant joint: Refer to Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

1. Comply with recommendations in TCA "Handbook for Ceramic Tile Installation" Vertical and Horizontal Joint Design Essentials. TCA System EJ 171-02.
   a. Locate joint in tile surfaces directly above joint in sub-floor or where indicated when used with isolation membranes to allow off-setting of joint location from sub-floor joint.
   b. Fasten full length to sub-floor using a construction adhesive.
   c. Trowel setting material with full coverage over the entire leg.
2. Set tile up against the joint ensuring that the top edge of the joint is flush or slightly below the top of the tile.

3.7 CERAMIC TILE - GENERAL

A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.

B. Comply with TCA Installation Guidelines

C. Installing Mortar Beds for Floors:
   1. For tile set with Portland cement paste over plastic mortar bed coordinate to set tile before mortar bed sets.

D. Setting Beds or Bond Coats:
   1. Set wall tile installed over concrete backer board in latex-Portland cement mortar, ANSI A108.1B.
   2. Set tile installed over gypsum board and gypsum plaster in organic adhesive, ANSI A108.4, TCA System W242-02.
   3. Set trim shapes in same material specified for setting adjoining tile.

E. 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.
   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 07920, SEALANTS AND CAULKING, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
   6. Completed work shall be free from hollow sounding areas and 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 shown.
      c. In areas where floor drains occur, slope to drains where shown.
   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 shown with tile.
      b. Finish reveals of openings with tile, except where other finish materials are shown or specified.

c. At window openings, provide tile stools and reveals, except where other finish materials are shown or specified.
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.
    b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
    c. Make joints in ceramic tile; maximum 3 mm (1/8 inch) wide.
    d. Make joints in porcelain tile; maximum 2mm (1/16 inch) wide
    e. Make joints in combine mixed formats 3mm (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 series of tile installation standards:
    a. Tile wall installations in wet areas, including showers, tub enclosures, laundries and swimming pools.
    b. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches or larger.
    c. Exterior tile wall installations.

3.8 THIN SET CERAMIC TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR

A. Installation of Tile: ANSI A108.5, except as specified otherwise.
B. Slope tile work to drains not less than 1 in 100 (1/8 inch per foot).

3.9 THIN SET CERAMIC TILE INSTALLED WITH ORGANIC ADHESIVE

Installation of Tile: ANSI A108.4.

3.10 GROUTING

A. Grout Type and Location:
    1. Grout for glazed wall and base tile, paver tile and unglazed mosaic tile, latex-Portland cement grout.
B. Grout Color: Refer to Drawings
C. Workmanship:
    1. Install and cure grout in accordance with the applicable standard.

3.11 MOVEMENT JOINTS

A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
B. TCA details EJ 171-02.

C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.

D. Rake out grout at joints between tile, service sink, at toe of base, and where shown and not less than 6 mm (1/4 inch) deep.

3.12 CLEANING

A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.

B. Methods and materials used shall not 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.

3.13 PROTECTION

A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.

B. Where traffic occurs over tile floor, 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.

3.11 TESTING FINISH FLOOR

A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1- GENERAL

1.1 DESCRIPTION

A. Metal ceiling suspension system for acoustical ceilings.

B. Acoustical units as specified in drawings.

C. Remove the existing ceiling within the renovated area and provide new ceiling as specified.

D. Coordinate acoustical ceiling system with above all ceiling equipment and infrastructure as required.

E. Provide new acoustical ceiling system as specified in drawings.

1.2 RELATED WORK

A. Access doors in adhesive applied tile.

1.3 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Acoustical units, each type, with label indicating conformance to specification requirements, including units specified to match existing.
2. Colored markers for units providing access.

C. Manufacturer's Literature and Data:

1. Ceiling suspension system, each type, showing complete details of installation, including suspension system specified to match existing and upward access system details for concealed grid systems.
2. Acoustical units, each type
3. Runners designed for snap-in attachment of metal pans.

D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

1.4 DEFINITIONS

A. Standard definitions as defined in ASTM C634.

B. Terminology as defined in ASTM E1264.

1.5 APPLICABLE PUBLICATIONS

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

B. American Society for Testing and Materials (ASTM):
A641/A641M-03.....Zinc-coated (Galvanized) Carbon Steel Wire

A653/A653M-08.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
C423-08a.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
C634/C634M-07).....Standard Terminology Relating to Environmental Acoustics
C635/C635M-07.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
C636/C636M-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
E84-08.....Surface Burning Characteristics of Building Materials
E119-08a.....Fire Tests of Building Construction and Materials
E413-04.....Classification for Rating Sound Insulation.
E580/E580M-08.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
E1264-08.....Classification for Acoustical Ceiling Products

PART 2- PRODUCTS

2.1 METAL SUSPENSION SYSTEM

A. ASTM C635, heavy-duty system, except as otherwise specified.
   1. Ceiling suspension system members may be fabricated from either of the following unless specified otherwise.
      a. Galvanized cold-rolled steel, bonderized.
      b. Extruded aluminum.
      c. Fire resistant plastic (glass fiber) having a flame spread and smoke developed rating of not more than 25 when tested in accordance with ASTM E84.
   2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.
   3. Use aluminum suspension in kitchens and aluminum or fire resistant plastic in toilets adjacent to shower areas, hydrotherapy, and swimming pools.
B. Exposed grid suspension system for support of lay-in panels:
   1. Exposed grid width not less than 22 mm (7/8 inch) with not less than 8 mm (5/16 inch) panel bearing surface.

2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members.
3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units unless specified otherwise.

2.2 PERIMETER SEAL

A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
B. Thickness as required to fill voids between back of wall molding and finish wall.
C. Not less than 9 mm (3/8 inch) wide strip.

2.3 WIRE

A. ASTM A641.
B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.4 ANCHORS AND INSERTS

A. Use anchors or inserts to support twice the loads imposed by hangers attached thereto.
B. Hanger Inserts:
   1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
   2. Nailing type option for wood forms:
      a. Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
      b. Lower portion provided with not less than 8 mm (5/16 inch) hole to permit attachment of hangers.
   3. Flush ceiling insert type:
      a. Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
      b. Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
      c. Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.
C. Clips:
   1. Galvanized steel.

2. Designed to clamp to steel beam or bar joists, or secure framing member together.
3. Designed to rigidly secure framing members together.
4. Designed to sustain twice the loads imposed by hangers or items supported.

D. Tile Splines: ASTM C635.

2.5 CARRYING CHANNELS FOR SECONDARY FRAMING

A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.

B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

2.6 ACOUSTICAL UNITS

A. General:

1. ASTM E1264, weighing 3.6 kg/m^2 (3/4 psf) minimum for mineral fiber panels or tile.
2. Class A Flame Spread: ASTM 84
3. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
4. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.
5. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces, except as specified otherwise. Colored units integrally colored throughout.
6. Lay-in panels: Sizes as shown.

B. Finish and Type: Refer to Drawings.

2.7 ACCESS IDENTIFICATION

A. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of paper of plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.

B. Use markers of the same diameter throughout building.

C. Color Code: Use following color markers for service identification:

Color.....Service

Red.....Sprinkler System: Valves and Controls

Green.....Domestic Water: Valves and Controls
Yellow.....Chilled Water and Heating Water
Orange.....Ductwork: Fire Dampers
Blue.....Ductwork: Dampers and Controls
Black.....Gas: Laboratory, Medical, Air and Vacuum

PART 3 EXECUTION

3.1 CEILING TREATMENT

A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.

B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.

C. 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.

D. 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.

E. Existing ceiling:
   1. Where extension of existing ceilings occur, 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.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

A. General:
   1. Install metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636, except as specified otherwise.
   2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
   3. Support a maximum area of 1.48 m^2 (16 sf) of ceiling per hanger.

4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
6. Provide not less than 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,
7. Use main runners not less than 1200 mm (48 inches) in length.
8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:

1. Concrete:
   a. Install hanger inserts and wire loops required for support of hanger and bracing wire in concrete forms before concrete is placed. Install hanger wires with looped ends through steel deck if 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. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.
      (1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.
      (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 fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.
   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.

B. Direct Hung Suspension System:

1. As illustrated in ASTM C635.
2. Support main runners by hanger wires attached directly to the structure overhead.
3. 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. Indirect Hung Suspension System:
1. As illustrated in ASTM C635.
2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) or center so as to insure that specified requirements are not exceeded.
3. Support main runners by specially designed clips attached to carrying channels.

3.3 ACOUSTICAL UNIT INSTALLATION

A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
1. Install tile to lay level and in full contact with exposed grid.
2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.

C. Markers:
1. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.
2. Attach colored markers to exposed grid on opposite sides of the units providing access.
3. Attach marker on exposed ceiling surface of upward access acoustical unit.

3.4 CLEAN-UP AND COMPLETION

A. Replace damaged, discolored, dirty, cracked and broken acoustical units.

B. Leave finished work free from defects.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of vinyl or rubber base.

1.2 RELATED WORK

A. Integral base with sheet flooring: Section 09 65 16, RESILIENT SHEET FLOORING.

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. Base material manufacturer's recommendations for adhesives.
3. Application and installation instructions.

C. Samples:

1. Base: 150 mm (6 inches) long, each type and color.
2. Adhesive: Literature indicating each type.

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 will be rejected.

1.5 STORAGE

A. Store materials in weather tight and dry storage facility.

B. Protect material from damage by handling and construction operations before, during, and after installation.

1.6 APPLICABLE PUBLICATIONS

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

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

F1344-04.....Rubber Floor Tile
F1859-04.....Rubber Sheet Floor Covering without Backing
F1860-04.....Rubber Sheet Floor Covering with Backing
F1861-08.....Resilient Wall Base

C. Federal Specifications (Fed. Spec.):

RR-T-650E.....Treads, Metallic and Non-Metallic, Nonskid

PART 2 – PRODUCTS

2.1 GENERAL

Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

A. Refer to drawings for drawings for finish specification.
B. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 inches) high, Type TP Rubber, Thermoplastics, Group 2-layered with molded top. Style B-cove.
C. Where carpet occurs, use Style A-straight.
D. Use only one type of base throughout.

2.3 PRIMER (FOR CONCRETE FLOORS)

As recommended by the adhesive and tile manufacturer.

2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)

Provide products with latex or polyvinyl acetate resins in the mix.

2.5 ADHESIVES

A. Use products recommended by the material manufacturer for the conditions of use.
B. Use low-VOC adhesive during installation. Water based adhesive with low VOC is preferred over solvent based adhesive.

PART 3 – EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of materials above 21° C (70 °F), for 48 hours before installation.
B. Maintain temperature of rooms where work occurs, between 21° C and 27° C (70°F and 80°F) for at least 48 hours, before, during, and after installation.
C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

3.2 INSTALLATION REQUIREMENTS

A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Resident Engineer.
B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.
C. The Resident Engineer reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.

3.3 PREPARATION

A. Examine surfaces on which material is to be installed.
B. Fill cracks, pits, and dents with leveling compound.
C. Level to 3 mm (1/8 inch) maximum variations.
D. Do not use adhesive for leveling or filling.
E. Grind, sand, or cut away protrusions; grind high spots.
F. Clean substrate area of oil, grease, dust, paint, and deleterious substances.
G. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.
H. Preparation of existing installation:
   1. Remove existing base and stair treads including adhesive.
   2. Do not use solvents to remove adhesives.
   3. Prepare substrate as specified.

3.4 BASE INSTALLATION

A. Location:
   1. Unless otherwise specified or shown, where base is scheduled, install base over toe space of base of casework, lockers, laboratory, pharmacy furniture island cabinets and where other equipment occurs.
   2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
B. Application:
   1. Apply adhesive uniformly with no bare spots.
   2. Set base with joints aligned and butted to touch for entire height.
   3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
      a. Short pieces to save material will not be permitted.
      b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
C. Form corners and end stops as follows:
   1. Score back of outside corner.
   2. Score face of inside corner and notch cove.
D. Roll base for complete adhesion.

3.5 CLEANING AND PROTECTION

A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.
B. Keep traffic off resilient material for at least 72 hours after installation.
C. Clean and polish materials in the following order:

1. After two weeks, scrub resilient base, sheet rubber and treads materials with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue. Polish resilient base to a gloss finish.
2. Do not polish tread and sheet rubber materials.

D. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the Resident Engineer.

E. Where protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section specifies the installation of sheet flooring with backing and integral cove base.

B. Grades of resilient sheet vinyl floor covering without backing having vinyl plastic wearlayer with backing.

C. Installation of sheet flooring including following:

1. Heat welded seams.
2. Integral cove base: Installed at intersection of floor and vertical surfaces.

D. The existing flooring is to be removed (and abated) prior to installing new flooring. Refer to Drawings

E. Provide new sheet flooring where specified.

F. Coordinate sheet flooring prep and installation with magnetic floor shielding assembly.

1.2 RELATED WORK

A. Resilient base required over metal base of casework: Section 12 34 00, MANUFACTURED PLASTIC CASEWORK.

C. Resilient base over base of lockers, equipment and casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

D. Unbacked vinyl (homogenous) sheet flooring with welded seams: Section 09 65 16, RESILIENT SHEET FLOORING.

E. Asbestos abatement: Section 02 82 13.19, ASBESTOS FLOOR TILE AND MASTIC ABATEMENT

F. Integral Cove base over base of Plastic Laminate Healthcare Casework: Section 12 35 70: PLASTIC LAMINATE HEALTHCARE CASEWORK

1.3 QUALITY CONTROL-QUALIFICATIONS:

A. The Contracting Officer shall approve products or service of proposed manufacturer, suppliers, and installers, and the Contractor shall submit certification that:

1. Heat welded seaming is manufacturer's prescribed method of installation.
2. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.
3. Manufacturer's product submitted has been in satisfactory operation, on three installations similar and equivalent in size to this project for three years. Submit list of installations.

B. The sheet vinyl floor coverings shall meet fire performance characteristics as determined by testing products, per ASTM test method, indicated below by Underwriters Laboratories, Inc. (UL) or another recognized testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
   2. Smoke Density: Less than 450 per ASTM E662.

C. The floor covering manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

1.4 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit following:

B. Manufacturer's Literature and Data:
   1. Description of resilient material and accessories to be provided.
   2. Resilient material manufacturer's recommendations for adhesives, weld rods, sealants, and underlayment.
   3. Application and installation instructions.

C. Samples:
   1. Sheet material, 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with a welded seam using proposed 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. Adhesive, underlayment and primer: Pint container, each type.

1.5 PROJECT CONDITIONS

A. Maintain temperature of floor materials and room, where work occurs, above 18 ° C (65 °F) and below 38 °C (100 °F) for 48 hours before, during and for 48 hours after installation. After above period, room temperature shall not fall below 13 °C (55 °F).

B. Construction in or near areas to receive flooring work shall be complete, dry and cured. Do not install resilient flooring over slabs until they have been cured and are sufficiently dry to achieve a bond

with adhesive. Follow flooring manufacturer's recommendations for bond and moisture testing.

C. Building shall be permanently enclosed. Schedule construction so that floor receives no construction traffic when completed.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.

B. Deliver sheet flooring full width roll, completely enclosed in factory wrap, clearly marked with the manufacturer's number, type and color, production run number and manufacture date.

C. Store materials in weathertight and dry storage facility. Protect from damage due to handling, weather, and construction operations before, during and after installation. Store sheet flooring on end with ambient temperatures maintained as recommended by manufacturer.

D. Store sheet flooring on end.

E. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

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. American Society For Testing Materials (ASTM):

E648-08.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source.

E662-06e1.....Specific Optical Density of Smoke Generated by Solid Materials.

F710-08.....Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

F1303-04.....Sheet Vinyl Floor Covering with Backing.

F1913-04.....Sheet Vinyl Flooring without Backing

C. Resilient Floor Covering Institute (RFCI):

Recommended Work Practices for Removal of Resilient Floor Coverings.

1.8 SCHEDULING

Interior finish work such as plastering, drywall finishing, concrete, terrazzo, ceiling work, and painting work shall be complete and dry before installation. Mechanical, electrical, and other work above ceiling line shall be completed. Heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.9 WARRANTY:

Submit written warranty, in accordance with FAR clause 52.246-21, Warranty of Construction requirements except that warranty period shall be extended to include two (2) years.

PART 2 – PRODUCTS

2.1 SHEET VINYL FLOOR COVERINGS

A. Sheet Vinyl Floor Coverings: Smooth face, minimum thickness nominal 2 mm (0.08 inch). Sheet flooring shall conform to ASTM F1913 and material requirements specified in ASTM F1303, Type II, Grade 1, backing classification not applicable. Foam backed sheet flooring is not acceptable.

B. Size: Provide maximum size sheet vinyl material produced by manufacturer to provide minimum number of joints. Minimum size width acceptable - 1200 mm (48 inches).

C. Each color and pattern of sheet flooring shall be of same production run.

D. Refer to drawings for types.

2.2 WELDING ROD:

Product of floor covering manufacturer in color shall match field color of sheet vinyl covering.

2.3 APPLICATION MATERIALS AND ACCESSORIES

A. Floor and Base Adhesive: Type recommended by sheet flooring material manufacturer for conditions of use.

B. Mastic Underlayment (for concrete floors): Provide products with latex or polyvinyl acetate resins in mix. Condition to be corrected shall determine type of underlayment selected for use.

C. Base Accessories:

1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with resilient sheet material.
2. Cap Strip: Extruded flanged zero edge vinyl reducer strip approximately 25 mm (one inch) exposed height with 13 mm (1/2 inch) flange.

2.4 SHEET FLOORING

A. ASTM F1303, Type II, Grade 1, except for backing requirements. Foam backed sheet flooring is not acceptable.

B. Minimum nominal thickness 2 mm (0.08 inch); 1800 mm (6 ft) minimum width.

C. Critical Radiant Flux: 0.45 watts per sq.cm or more, Class I, per ASTM E648.

D. Smoke density: less than 450 per ASTM E662.

E. Color and pattern of sheet flooring of the same production run.

2.5 ADHESIVES

Water resistant type recommended by the sheet flooring manufacturer for the conditions of use.

2.6 BASE CAP STRIP AND COVE STRIP

A. Extruded vinyl compatible with the sheet flooring.

B. Cap strip "J" shape with feathered edge flange approximately 25 mm (one inch) wide; top designed to receive sheet flooring with 13 mm (1/2 inch) flange lapping top of flooring

C. Cove strip 70 mm (2-3/4 inch) radius.

2.7 LEVELING COMPOUND (FOR CONCRETE FLOORS)

Provide cementitious products with latex or polyvinyl acetate resins in the mix.

2.8 LEVELING COMPOUND/PRIMER (FOR MAGNETIC FLOOR SHIELDING)

As recommended by the adhesive or sheet flooring manufacturer over the specific shielding materials for the specific use and use conditions.

2.9 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive or sheet flooring manufacturer.

2.10 EDGE STRIPS

A. Rubber, Color to match new flooring.

B. 1-5/8 inch wide, 1/4 inch thick, bevel one edge to 1/8 inch thick.

C. Fully adhesively adhere edge strip to flooring. Adhesive to be as recommended by the floor accessory or sheet flooring manufacturer. Install per manufacturer's recommendations.

2.11 SEALANT

A. Compatible with sheet flooring.

PART 3 – EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of sheet flooring above 36 °C (97 °F), for 48 hours before installation.

B. Maintain temperature of rooms where sheet flooring work occurs above 36 °C (97 °F), for 48 hours, before installation and during installation.

C. After installation, maintain temperature at or above 36 °C (97 °F.)

D. Building is permanently enclosed.

E. Wet construction in or near areas to receive sheet flooring is complete, dry and cured.

3.2 SUBFLOOR PREPARATION

A. Installation for Resilient Flooring over existing VCT (Asbestos Containing Material)
   1. Installer shall examine surfaces on which resilient sheet flooring is to be installed, and shall advise Contractor, in writing, of areas which are unacceptable for installation of flooring material. Installer shall advise Contractor which methods are to be used to correct conditions that will impair proper installation. Installation shall not proceed until unsatisfactory conditions have been corrected.
   2. Substrates shall be dry, free of curing compounds, sealers, hardeners, and other materials which would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by Resilient Floor Covering Institute recommendations in manual RFCI-MRP.
   3. Remove all existing topical sealers and wax materials using a commercial grade stripper. This can be heavily alkaline or acidic. Consult your chemical supplier prior to stripping. Follow manufacturer's directions, and remove all waxes. Etch the floor with stripper to prep the substrate for adhering floor patch.
   4. Rinse floor thoroughly and vacuum up all liquids.
   5. When the floor is dry either trowel a cementitious patch material such as Ardex Feather Finish or similar. A self-leveling material may also be used.
   6. Sand smooth when dry.

B. Broom or vacuum clean substrates to be covered by sheet vinyl floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.

C. Primer: If recommended by flooring manufacturer, prior to application of adhesive, apply concrete slab primer in accordance with manufacturer's directions.

D. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.

E. Fill cracks, joints, depressions, and other irregularities in leveling compound.
   1. Do not use adhesive for filling or leveling purposes.
   2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.

3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.

F. Clean floor of oil, paint, dust and deleterious substances. Leave floor dry and cured free of residue from existing curing or cleaning agents.

G. Subfloor Testing:
Determine adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MPR.

3.2 INSTALLATION OF FLOORING

A. Install work in strict compliance with manufacturer's instructions and approved layout drawings.

B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams.

C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.

D. Match edges of resilient floor coverings for color shading and pattern at seams.

E. Where resilient sheet flooring abuts other flooring material floors shall finish level.

F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

G. Inform the Resident Engineer of conflicts between this section and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.

H. Install sheet in full coverage adhesives.
1. Air pockets or loose edges will not be accepted.
2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.

I. Keep joints to a minimum; avoid small filler pieces or strips.

J. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.

K. Follow manufacturer's recommendations regarding pattern match, if applicable.

L. Installation of Edge Strips:
1. Locate edge strips under center lines of doors unless otherwise indicated.
2. Set aluminum strips in adhesive, anchor with lead anchors and stainless steel Phillips screws.

M. Integral Cove Base Installation:
   1. Set preformed fillet strip to receive base.
   2. Install the base with adhesive, terminate expose edge with the cap strip.
   3. Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
   4. Solvent weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.
   5. Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces. Provide sheet flooring and base scheduled for room on floors and walls under and behind areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

3.3 INSTALLATION OF INTEGRAL COVED BASE

A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 100 mm (4 inches)high.
B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners.

3.4 WELDING

A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.
B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.
C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.
D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3.5 CLEANING

A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.
B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.
C. Clean and polish materials per flooring manufacturer's written recommendations.
D. Vacuum floor thoroughly.

E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer's recommendations.

F. Upon completion, Resident Engineer shall inspect floor and base to ascertain that work was done in accordance with manufacturer's printed instructions.

G. Perform initial maintenance according to flooring manufacturer's written recommendations.

3.6 PROTECTION:

A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.

B. Keep traffic off sheet flooring for 24 hours after installation.

C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the Resident Engineer.

D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of vinyl composition tile flooring and accessories.

B. Remove existing floor finish, prep surfaces as required to receive new flooring, and install new flooring as specified.

1.2 RELATED WORK

A. Color and pattern and location in room finish schedule: Refer to Drawings

B. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

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 manufacturers recommendations for adhesives, underlayment, primers and polish.
3. Application and installation instructions.

C. Samples:

1. Tile: 300 mm by 300 mm (12 inches by 12 inches) for each type, pattern and color.
2. Edge Strips: 150 mm (6 inches) long, each type.
3. Feature Strips: 150 mm (6 inches) long.

D. Shop Drawings:

1. Layout of patterns shown on the drawings and in Section 09 06 00, SCHEDULE FOR FINISHES.
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.
2. Tested per ASTM F510.

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 will be rejected.

1.5 STORAGE

A. Store materials in weathertight and dry storage facility.

B. Protect from damage from handling, water, and temperature.

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):

D4078-02 (2008).....Water Emulsion Floor Finish

E648-08.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-06e1.....Specific Optical Density of Smoke Generated by Solid Materials

E1155-96 (2008).....Determining Floor Flatness and Floor Levelness Numbers

F510-93 (2004).....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method

F710-08.....Preparing Concrete Floors to Receive Resilient Flooring

F1066-04.....Vinyl Composition Floor Tile

F1344-04.....Rubber Floor Tile

F1700-04.....Solid Vinyl Floor Tile

C. Resilient Floor Covering Institute (RFCI):

IP #2.....Installation Practice for Vinyl Composition Tile (VCT)

D. Federal Specifications (Fed. Spec.):

SS-T-312.....Tile Floor: Asphalt, Rubber, Vinyl and Vinyl Composition

PART 2 - PRODUCTS

2.1 GENERAL

A. Furnish product type, materials of the same production run and meeting following criteria.

B. Use adhesives, underlayment, primers and polish recommended by the floor resilient material manufacturer.

C. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E 648.

D. Smoke density: Less than 450 per ASTM E662.

2.2 VINYL COMPOSITION TILE

A. ASTM F1066, Composition 1, Class I (solid color), Class 2 (through pattern), 300 mm (12 inches) square, 3 mm (1/8 inch) thick.

B. Color and pattern uniformly distributed throughout thickness.

2.3 ADHESIVES

A. Comply with applicable regulations regarding toxic and hazardous materials Green Seal (GS-36) for commercial adhesive.

B. Use low-VOC adhesive during installation. Water based is preferred over solvent based adhesives.

2.4 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive and tile manufacturer.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.

B. Determine the type of underlayment selected for use by the condition to be corrected.

2.6 POLISH AND CLEANERS

A. Cleaners RFCI CL-1.

B. Polish: ASTM D4078.

2.7 EDGE STRIPS

A. 28 mm (1-1/8 inch) wide unless shown otherwise.

B. Bevel from maximum thickness to minimum thickness for flush joint unless shown otherwise.

C. Extruded aluminum, mill finish, mechanically cleaned:

1. Drill and counter sink edge strip for flat head screws.
2. Space holes near ends and approximately 225 mm (9 inches) on center between.

D. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl.

2.8 SCREWS

Stainless steel flat head screw.

2.9 FEATURE STRIPS

A. Use same material as floor tile.

B. Sizes and shapes as shown.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of materials a minimum of 22 °C (70 °F,) for 48 hours before installation.

B. Maintain temperature of rooms where work occurs between 21 ºC and 27 ºC (70 ºF and 80 ºF), for at least 48 hours, before, during and after installation.

C. 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 PREPARATION

A. Verify that concrete slabs comply with ASTM F710. At existing slabs, determine levelness by F-number method in accordance with ASTM E1155. Overall value shall not exceed as follows:
   FF30/FL20

B. Correct conditions which will impair proper installation.

C. Fill cracks, joints and other irregularities in concrete with leveling compound:
   1. Do not use adhesive for filling or leveling purposes.
   2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
   3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joints.

D. Clean floor of oil, paint, dust, and deleterious substances: Leave floor dry and cured free of residue from existing curing or cleaning agents.

E. Concrete Subfloor Testing:
   Determine Adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MRP.

F. Perform additional subfloor preparation to obtain satisfactory adherence of flooring if subfloor test patches allows easy removal of tile.

G. Prime the concrete subfloor if the primer will seal slab conditions that would inhibit bonding, or if priming is recommended by the tile or adhesive manufacturers.

H. Preparation of existing installation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives.

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 will not be accepted.

C. Tile Layout:

1. If layout is not shown on drawings, lay tile symmetrically about center of room or space with joints aligned.
2. No tile shall be less than 150 mm (6 inches) and of equal width at walls.
3. Place tile pattern in the same direction; do not alternate tiles.

D. Trim tiles to touch for the length of intersections at pipes and vertical projections, seal joints at pipes with waterproof cement.

E. Application:
1. Apply adhesive uniformly with no bare spots.
   a. Conform to RFC1-TM-6 for joint tightness and for corner intersection unless layout pattern shows random corner intersection.
   b. More than 5 percent of the joints not touching will not be accepted.
2. Roll tile floor with a minimum 45 kg (100 pound) roller. No exceptions.
3. The Resident Engineer may have test tiles removed to check for non-uniform adhesion, spotty adhesive coverage, and ease of removal. Install new tile for broken removed tile.

F. Installation of Edge Strips:
1. Locate edge strips under center line of doors unless otherwise shown.
2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws specified.
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 and polish materials in the following order:
1. For the first two weeks sweep and damp mopped only.
2. After two weeks, scrub resilient materials with a minimum amount of water and a mild detergent. Leave surface clean and free of detergent residue.
3. Apply polish to the floors in accordance with the polish manufacturer's instructions.

D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Resident Engineer. 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 Resident Engineer.

E. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, lightly re-apply polish and buff floors.

3.6 LOCATION

A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 65 20
RESILIENT PLANK FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of solid vinyl plank flooring.

1.2 RELATED WORK

B. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

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 manufacturers recommendations for adhesives, underlayment, primers and polish.
3. Application and installation instructions.

C. Samples:

1. Submit sample for each type.

D. Shop Drawings:

1. Layout of patterns shown on the drawings.
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.
2. Tested per ASTM F510.

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 will be rejected.

1.5 STORAGE

A. Store materials in weathertight and dry storage facility.

B. Protect from damage from handling, water, and temperature.

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):

D4078-02 (2008).....Water Emulsion Floor Finish

E648-08.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-06e1.....Specific Optical Density of Smoke Generated by Solid Materials

E1155-96 (2008).....Determining Floor Flatness and Floor Levelness Numbers

F510-93 (2004).....Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method

F710-08.....Preparing Concrete Floors to Receive Resilient Flooring

F1066-04.....Vinyl Composition Floor Tile

F1344-04.....Rubber Floor Tile

F1700-04.....Solid Vinyl Floor Tile

C. Resilient Floor Covering Institute (RFCI):

IP #2.....Installation Practice for Vinyl Composition Tile (VCT)

D. Federal Specifications (Fed. Spec.):

SS-T-312.....Tile Floor: Asphalt, Rubber, Vinyl and Vinyl Composition

PART 2 – PRODUCTS

2.1 GENERAL

A. Furnish product type, materials of the same production run and meeting following criteria.

- Classification: ASTM F 1700 Class III Solid Vinyl Tile
- Construction: Layered product consisting of wearlayer, decorative film, and backing with pre-and post-consumer content.
- Overall Thickness: .120" / 3 mm (nominal)
- Wearlayer Thickness: .030" clear, rigid high density PVC
- Size: 4" x 36"
- Edge: Square Edge (SE)
- Surface Texture: Natural Grain (NG)
- Standard Colors: to be selected from the manufacturer's standard.
- Warranty: 20 years Commercial.
- Recycling: Suitable
- Test Performance: ASTM E 648: Critical Radiant Flux Class1 CRF>0.45
  ASTM E 662: Smoke Density <450
  ASTM F 925: Chemical Resistance Excellent
- Slip Resistance: ADA Compliant Varies with surface texture, FTC Slip Resistant Classified Product

2.2 ADHESIVES

A. Comply with applicable regulations regarding toxic and hazardous materials Green Seal (GS-36) for commercial adhesive.

B. Use low-VOC adhesive during installation. Water based is preferred over solvent based adhesives.

2.3 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive and tile manufacturer.

2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)

A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.

B. Determine the type of underlayment selected for use by the condition to be corrected.

2.5 POLISH AND CLEANERS

A. Cleaners RFCI CL-1.

B. Polish: ASTM D4078.

2.6 EDGE STRIPS

A. 28 mm (1-1/8 inch) wide unless shown otherwise.

B. Bevel from maximum thickness to minimum thickness for flush joint unless shown otherwise.

C. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl.

2.7 SCREWS

Stainless steel flat head screw.

2.8 FEATURE STRIPS

A. Use same material as floor tile.

B. Sizes and shapes as shown.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of materials a minimum of 22 °C (70 °F,) for 48 hours before installation.

B. Maintain temperature of rooms where work occurs between 21 °C and 27 °C (70 °F and 80 °F), for at least 48 hours, before, during and after installation.

C. 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 PREPARATION

A. Testing

- Moisture Test Methods: Perform moisture tests on all concrete floors scheduled to receive Vinyl Plank, to meet ASTM F 1869 (calcium chloride test) or ASTM F 2170 (relative humidity). Testing should be performed in several areas including the perimeter of the room, at columns, and wherever else moisture might occur. The moisture level from the concrete

should not exceed 6.0 lbs./1000 sq. ft. (CC) or 75% relative humidity in a 24 hour time period. Do not proceed if the concrete exceeds the moisture limitations. After remediation, always retest to ensure that the problem has been corrected.

- PH Test: PH levels are important. A concrete slab should have a PH level not to exceed 9.0 before, during, and after installation.

B. Correct conditions which will impair proper installation.

C. Fill cracks, joints and other irregularities in concrete with leveling compound:
   1. Do not use adhesive for filling or leveling purposes.
   2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
   3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joints.

D. Clean floor of oil, paint, dust, and deleterious substances: Leave floor dry and cured free of residue from existing curing or cleaning agents.

E. Concrete Subfloor Testing:
   Determine Adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MRP.

F. Perform additional subfloor preparation to obtain satisfactory adherence of flooring if subfloor test patches allows easy removal of tile.

G. Prime the concrete subfloor if the primer will seal slab conditions that would inhibit bonding, or if priming is recommended by the tile or adhesive manufacturers.

H. Preparation of existing installation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.

B. Do not install materials with an apparent defect.

C. Planks and adhesive should be present at the jobsite for at least 48 hours at a temperature between 68-72 degrees F in order to acclimate properly. Avoid installations with ambient temperatures above 80 degrees F and below 60 degrees F. The tiles, room, and existing floor must be at room temperature (68-72 degrees F). Avoid extreme cold and hot situations.

D. Start in center of room.

E. When a cut is made to the plank, place that cut edge along a wall. Placing a cut edge against the uncut edge of another piece of flooring will not look natural or realistic. Use the adhesive type recommended by the manufacturer, and spread adhesive following manufacturer's specific recommendations.

F. Installation of Edge Strips:
   1. Locate edge strips under center line of doors unless otherwise shown.
   2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws specified.
   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 and polish materials in the following order:
   1. For the first two weeks sweep and damp mopped only.
   2. After two weeks, scrub resilient materials with a minimum amount of water and a mild detergent. Leave surface clean and free of detergent residue.
   3. Apply polish to the floors in accordance with the polish manufacturer's instructions.

D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Resident Engineer. 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 Resident Engineer.

E. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, lightly re-apply polish and buff floors.

3.5 LOCATION

A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 67 23
RESINOUS FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies a seamless flooring system with integral base.

B. Flooring consists of epoxy resin, aggregate, and finish coats for non-slip finish.

C. Section includes the removal of existing flooring, prep floor as required, and install new flooring.

1.2 RELATED WORK

Color and room finish schedule: see drawings

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 product to be provided; technical data showing compliance with specifications.
2. Application and installation instructions, including proposed deviations from specifications.

C. Samples:

1. Each color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Sample 300 mm (12-inch) square in each finish specified.
3. Sample showing construction from substrate to finish surface in thickness specified.

D. Certification and Approval:

1. Manufacturer's certification of material compliance.
2. Manufacturer's approval of installers.
3. Contractor's certificate of compliance with Quality Assurance requirements.

E. Warranty: Manufacturers warranty of materials and installation.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer.
2. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.

B. Installer trained and approved by manufacturer of primary material and having completed at least ten projects of similar size and complexity.

C. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Resident Engineer.
   a. Include 48-inch (1200-mm) length of integral cove base.

D. Pre-Installation Conference

1. Arrange a meeting not less than thirty days prior to starting work.
2. Attendance
   a. Contractor
   b. Resident Engineer
   c. Manufacturer and Installer's Representative

1.5 MATERIAL PACKAGING DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Protect materials from damage and contamination in storage.

C. Maintain temperature of storage area between 15°C and 32°C (60° and 90°F).

D. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages.

1.6 WARRANTY

A. Work subject to the terms of the Article "Warranty of Construction" FAR clause 52.246-21.

B. Extend warranty period to three years.

1.7 APPLICABLE PUBLICATIONS

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

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

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C267-01 (R2006).....Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings

C413-01 (R2006).....Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings, and Polymer Concretes

C580-02 (R2008).....Flexural Strength and Modulus of Elasticity of Chemical Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes

C722-04.....Chemical-Resistant Resin Monolithic Surfacing
C811-98 (R2008).....Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacings
C882/C882M-05e1.....Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
D2047-97 (2008).....Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Epoxy resinous flooring includes concrete epoxy primer, colored quartz aggregate epoxy resin mortar, clear epoxy sealer coat, and finish coat for non-slip finish.
B. System resistant to chemicals and abrasion.
C. Basis of Design:
   1. Stonhard, Inc.; Stontec TRF® or approved equal.
      Contact: Brian Mastay 941-387-6297 or bmastay@stonhard.com.
D. System Characteristics:
   1. Color and Pattern: Select from manufactures standards
   2. Wearing Surface: Standard
   3. Integral Cove Base: 4"
   4. Overall System Thickness: Nominal 3/16", 5mm.
E. System Components: Manufacturer's standard components that are compatible with each other and as follows:
   1. Primer:
      a. Material Basis: Stonhard Urethane Primer.
      b. Resin: Urethane.
      c. Formulation Description: (2) two component, low viscosity, urethane.
      d. Application Method: Squeegee and nap roller.
      e. Number of Coats: (1) one.
   2. Body Coat(s):
      a. Material Basis: Stonclad UR
      b. Resin: Urethane 100% solids.
      c. Formulation Description: 4 components.
      d. Application Method: Screed and Metal trowel.
         1) Thickness of Coats: 1/8"/ 3mm, with primer coat
         2) Number of Coats: One.
   3. Under coat: Bonding coat for vinyl flake broadcast.

a. Material Basis: Stontec epoxy undercoat.
b. Resin: Epoxy
c. Formulation Description: 100% solids.
d. Type: Pigmented.
e. Number of Coats: one

4. Broadcast: Vinyl Flake.
   a. Material Basis: Stontec Flake
   b. Formulation Description: Decorative flake for broadcasting.
   c. Type: Tweed (chips to be mixed in Mfg. facility)
   d. Finish: standard.
   e. Number of Coats: one.
5. Topcoat:
   a. Material Basis: Stontec UTF sealer.
   b. Resin: Aliphatic polyaspartic.
   c. Formulation Description: Two-component, UV resistant
   d. Type: Clear.
   e. Finish: Gloss.
   f. Number of Coats: two

Note: Components listed above are the basis of design intent; all bids will be compared to this standard including resin chemistry, color, wearing surface, thickness, and installation procedures, including number of coats. Contractor shall be required to comply with all the requirements of the Specifications and all of the components required by the Specifications, whether or not such products are specifically listed above.

2.2 ACCESSORY MATERIALS

A. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated. No Single component or cementitious materials.
B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
   1. Mechanically prepare substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

3. Verify that concrete substrates are dry.

a. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75 percent.

b. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 7 lb of water/1000 sq. ft. of slab in 24 hours.

c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions. Resinous materials only.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations

F. Maintain temperature of materials above 21°C (70 degrees F), for 48 hours before installation.

G. Maintain temperature of rooms where work occurs, between 21°C and 32°C (70°F and 90°F) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 21°C (70 degrees F) thereafter.

H. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

I. Concrete substrate cured and not less than 30 days old.

J. Area free of other trades during and for a period of 24 hours after installation.

3.2 INSTALLATION REQUIREMENTS

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations

   a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply primer where required by resinous system, over prepared substrate at manufacturer's recommended spreading rate.

C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base. Round internal and external corners. Refer to detail drawings.

D. Mix and apply mortar base as indicated for flooring system and at coverage rates recommended in writing by manufacturer. Screed mortar materials, compact and smooth mortar base with steel finishing trowels.

E. Apply undercoat bonding for broadcast flakes. squeegee in thickness indicated for flooring system. Back roll liquids with finish rollers.

F. Broadcasts: Vinyl chip, in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer

G. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 TERMINATIONS

A. Chase edges to "lock" the coating system into the concrete substrate along lines of termination.

B. Penetration Treatment: Lap and seal coating onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

C. Trenches: Continue coating system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

D. Treat floor drains by chasing the coating to lock in place at point of termination.

3.4 JOINTS AND CRACKS

A. Treat control joints to bridge potential cracks and to maintain monolithic protection.

B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Resident Engineer.

B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.

3.5 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous flooring materials from damage and wear during construction operation.

1. Cover flooring with kraft paper.
2. Covers paper with 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.

D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

3.6 TOLERANCE

A. From line of plane: Maximum 3 mm (1/8 inch) in total distance of flooring and base.

B. From radius of cove: Maximum of 3 mm (1/8 inch) plus or 1.6 mm (1/16-inch) minus.

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SECTION 09 69 00
ACCESS FLOORING

PART 1 - GENERAL

1.1 Section Includes

A. Work of this section includes, but is not limited to: access floor panels, floor coverings, understructure and various electrical, data and communication accessories.

1.2 Related Sections

A. Concrete sealer shall be compatible with pedestal adhesive, see Division 3.

B. See Division 26 Section "Grounding and Bonding for Electrical Systems" for connection to ground of access flooring understructure. Note: The electrical engineer or contractor shall determine requirements for grounding and the electrical contractor shall provide the necessary labor and materials to electrically connect the access flooring to the building ground if it is required.

1.3 Environmental Conditions for Storage and Installation

A. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20% to 80%. All floor panels shall be stored at ambient temperature between 50° to 90° F for at least 24 hours before installation begins. All areas of installation shall be enclosed and maintained at ambient temperature between 50° to 90° F and at relative humidity levels between 20% to 80%, and shall remain within these environmental limits throughout occupancy.

1.4 References

A. CISCA (Ceilings & Interior Systems Construction Association) - "Recommended Test Procedures for Access Floors" shall be used as a guideline when presenting load performance product information.

1.5 Performance Certification

A. Product tests shall be witnessed and certified by independent engineering and testing laboratory based in the U.S. with a minimum of five years experience testing access floor components in accordance CISCA "Recommended Test Procedures for Access Floors".

1.6 Country-of-Origin and Product Marking

A. Access floor materials shall comply with the provisions outlined in FAR Subpart 25.2 - Buy American Act - Construction Materials.

B. Floor panels shall be permanently marked with manufacturer's name, product identification, manufacturing date and country-of-origin. Removable Product ID stickers are not acceptable.

1.7 Performance Requirements

A. **Design Load:** Panel supported on actual understructure (the system) shall be capable of supporting a safe working load or design load of 2000 lbs. This rating signifies that the system will withstand not only a concentrated load placed on a one square inch area at any location on the panel without yielding but also demonstrates the ability to withstand an overload capacity of two times its rating (ie. a safety factor of 2).

B. **Safety Factor:** Panel supported on actual understructure (the system) shall be capable of withstanding a minimum of (2) two times the design load anywhere on the panel without failure. Failure is defined as the point at which the system will no longer accept the load.

C. **Rolling Load:** Panel supported on actual understructure (the system) shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches. Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.

Wheel 1: Size:3" dia x 1 13/16" wide; Load: 1500 lbs.; Passes: 10

Wheel 2: Size:(A) 6" dia x 2" wide; Load: 1250 lbs. Passes: 10,000

D. **Impact Load:** Panel and supporting understructure (the system) shall be capable of supporting an impact load of 150 lbs. dropped from a height of 36 inches onto a one square inch area (using a round or square indentor) at any location on the panel.

E. **Panel Drop Test:** Panel shall be capable of being dropped face up onto to a concrete slab from a height of 36", after which it shall continue to meet all load performance requirements as previously defined.

F. **Panel Cutout:** Panel with an 8" diameter interior cutout supported on actual understructure shall be capable of maintaining its design load strength anywhere on the panel without the use of additional supports.

G. **Flammability:** System shall meet *Class A* Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.

H. **Combustibility:** All components of the access floor system shall qualify as non-combustible by demonstrating compliance with requirements of ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.

I. **Recycled Content:** Panel and understructure system shall be required to have a minimum recycled content of 30%.

J. **Axial Load:** Pedestal support assembly shall provide a 5000 lb. axial load without permanent deformation.

K. **Overturning Moment:** Pedestal support assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated concrete surface. ICBO number for the specific

system or structural calculations shall be required attesting to the lateral stability of the system under seismic conditions.

L. **Stringer Concentrated Load:** Stringer shall be capable of withstanding a concentrated load of 450 lbs. placed in its midspan on a one square inch area using a round or square indentor without exceeding a permanent set of 0.010" after the load is removed.

1.8 Design Requirements:

A. Access floor system, where indicated on the design documents, shall consist of modular and removable fully encased cementitious filled welded steel panels supported on all four edges by structural steel members which are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern.

B. Panel shall be easily removed by one person with a suction cup lifting device and shall be interchangeable except where cut for special conditions.

C. Quantities, finished floor heights (FFH) and location of accessories shall be as specified on the contract drawings.

1.9A Submittals for Review

A. Detail sheets, for each proposed product type, which provide the necessary information to describe the product and its performance.
B. Test reports, certified by an independent testing laboratory with a minimum of five years experience testing access floor components in accordance with CISCA Recommended Test Procedures, certifying that component parts perform as specified.

1.9B Submittals for Information

A. Manufacturer's installation instructions and guidelines.

B. Manufacturer's Owner Manual outlining recommended care and maintenance procedures.

PART 2 – PRODUCTS

2.1 Manufacturers

A. Access floor system with access floor panel supported by a bolted stringer understructure system.

B. Alternative products shall meet or exceed all requirements as indicated herein and must receive prior written approval by the architect or designer.

2.2 Support Components

Pedestals:

A. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater. Zinc electroplating shall be

prohibited on all pedestal components, including head plate, threaded rod, adjustment nut, pedestal tube, base plate, and all fasteners.

B. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.

C. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.

D. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 6" or greater). Note: This prevents the assembly from inadvertently losing its leveling adjustment when panels are removed from the installation during use.

E. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.

Stringers:

A. Stringers shall support each edge of panel.

B. Steel stringer shall have conductive galvannealed coating. Zinc electroplating shall be prohibited on stringers and stringer fasteners.

C. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.

D. Stringer grid shall be 4' stringers in a basketweave configuration ensuring maximum lateral stability in all directions.

2.3 Panel Components

Floor Panels:

A. Panels shall consist of a top steel sheet welded to a formed steel bottom pan filled internally with a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.

B. Floor panels shall be protected from corrosion by electro-deposited epoxy paint. The use of zinc electroplating shall be prohibited.

C. Cementitious fill material shall be totally encased within the steel welded shell except where cut for special conditions. Note: This greatly reduces the potential for dust in the environment from exposed cement materials.

2.4 Accessories

A. UL listed Power, Voice & Data Service Centers shall be provided in locations as detailed on the contract drawings. High capacity 11 ¼ inch square PVD Servicenters shall be capable of accommodating four duplex receptacles, three knockouts for standard voice/data faceplates or Tate voice/data interface plates (or grommeted interface plates). Standard capacity 7-5/16 by 6-15/16 inch PVD Servicenters shall be capable of accommodating two duplex receptacles and two Tate voice/data interface plates (or grommeted interface plates). The service outlet box shall be a drop-in design having a hinged Lexan lid with carpet insert and Lexan frame with tapered edge. Service outlet box shall be capable of withstanding without failure a load of 800 lb.

B. Provide manufacturer's standard steps, ramps, fascia plate, perimeter support, and grommets where indicated on the contract drawings.

C. Provide 20 spare floor panels and 20 square feet of understructure systems for each type used in the project for maintenance stock. Deliver to project in manufacturer's standard packaging clearly marked with the contents.

D. Provide 4 panel lifting devices.

2.5 Finishes

A. Finish the surface of floor panels with floor covering material as indicated on the contract drawings.

B. High-pressure laminate floor covering shall meet requirements of NEMA LD3, and shall conform with one of the following grades: Grade HDH (1/8"/ 3.0mm) or Grade HDM (1/16"/ 1.5mm).

C. High-pressure laminate floor coverings shall have an edge condition that is integral to the tile. Separate edge trim pieces are not acceptable.

D. All other tile coverings that require trim edge shall be applied to the panel's top surface and shall not wrap around the panel's edge.

E. Surface to Ground Resistance of Conductive Laminate Covering: Not less than 25,000 ohms (2.5×10^4), nor more than 1,000,000 ohms (1.0×10^6), as determined by testing in accordance with the test method for conductive flooring specified in Chapter 3 of NFPA 99, but modified to place one electrode on the floor surface and to attach one electrode to the understructure. Resistance shall be tested at 500 volts.

F. Finish Types:
1) ESD static control vinyl (tile): Factory-applied by Access Flooring Manufacturer with manufacturer to coordinate the purchase and custom fitting of resilient floor finish as specified in the drawings.

2.6 Fabrication Tolerances

A. Floor panel flatness measured on a diagonal: +/- 0.035"
B. Floor panel flatness measured along edges: +/- 0.025"
C. Floor panel width or length of required size: +/- 0.010"

D. Floor panel squareness tolerance: +/- 0.015"

PART 3 – EXECUTION

3.1 Preparation

A. Access Flooring Installer to carefully field cut panels as required to accommodate electrical components and devices. All cutting and openings to be in accordance with manufacturers recommendations.

B. Examine structural subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until structural floor surfaces are level, clean, and dry as completed by others.

C. Concrete sealers, if used, shall be identified and proven to be compatible with pedestal adhesive. Verify that adhesive achieves bond to slab before commencing work.

D. Verify dimensions on contract drawings, including level of interfaces including abutting floor, ledges and doorsills.

E. The General Contractor shall provide clear access, dry subfloor area free of construction debris and other trades throughout installation of access floor system.

F. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20 to 80%. At least 24 hrs. before installation begins, all floor panels shall be stored at ambient temperatures between 50° to 90° F and relative humidity levels between 20% to 80% and shall remain within these environmental limits throughout occupancy.

3.2 Installation

A. Pedestal locations shall be established from approved shop drawings so that mechanical and electrical work can be installed without interfering with pedestal installation.

B. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system. All traffic on access floor shall be controlled by access floor installer. No traffic but that of access floor installers shall be permitted on any floor area for 24 hours to allow the pedestal adhesive to set. Access floor panels shall not be removed by other trades for 72 hours after their installation.

C. Floor system and accessories shall be installed under the supervision of the manufacturer's authorized representative and according to manufacturer's recommendations.

D. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.

E. Access floor installer shall keep the subfloor broom clean as installation progresses.

F. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system where required.

G. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls, and cutouts.

H. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.

I. Finished floor shall be level, not varying more than 0.062" in 10 feet or 0.125" overall.

J. Inspect system prior to application of floor covering and replace any floor panels that are cracked, broken and structurally damaged and do not comply with specified requirements.

K. Acceptance: General contractor shall accept floor in whole or in part prior to allowing use by other trades.

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SECTION 09 91 00
PAINTING

PART 1-GENERAL

1.1 DESCRIPTION

A. Section specifies field painting.

B. Section specifies prime coats which may be applied in shop under other sections.

C. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.

D. Unless items are pre-finished, or scheduled to receive finish, all items exposed to view shall receive paint to match adjacent surfaces. Refer to instructions herein for the appropriate paint for the specific type of materials.

E. Refer to drawings for finish schedule and finish legend.

1.2 RELATED WORK

A. Shop prime painting of steel and ferrous metals: Divisions 8, 10, 12, 22, 23, 26, 27, 28 sections.

B. Contractor option: Pre-finished flush doors with transparent finishes: Section, 08 14 00 WOOD DOORS.

C. Type of Finish and Color- refer to drawings.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP Drawings, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:
Before work is started, or sample panels are prepared, submit manufacturer's literature, 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 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.

C. Sample Panels:

1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
2. Panels to show color: Composition board, 102 mm by 254 mm by 3 mm (4 inch by 10 inch by 1/8 inch).

3. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 102 by 254 by 3 mm (4 inch by 10 inch face by 1/4 inch) thick minimum, and where both flat and edge grain will be exposed, 254 mm (10 inches) long by sufficient size, 51 mm by 51 mm (2 by 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. Product type and color.
   c. Name of project.
5. Strips showing not less than 51 mm (2 inch) wide strips of undercoats and 102 mm (4 inch) wide strip of finish coat.

D. Sample of identity markers if used.

E. 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. Intumescing 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. If paint or other coating, state coat types; prime, body or finish.

C. Maintain space for storage, and handling of painting materials and equipment in a 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 18 and 30 degrees C (65 and 85 degrees F).

1.5 MOCK-UP PANEL

A. Before starting application of water paint mixtures, apply paint as specified to an area, not to exceed 9 m^2 (100 ft^2), selected by Resident Engineer.

B. Finish and texture approved by Resident Engineer will be used as a standard of quality for remainder of work.

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 basic designation only and should be of the latest edition available.

B. American Conference Of Governmental Industrial Hygienists (ACGIH):
ACGIH TLV-BKLT.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Sixth Edition)

C. American National Standards Institute (ANSI):
A13.1.....Scheme for the Identification of Piping Systems

D. American Society for Testing and Materials (ASTM):
D260.....Boiled Linseed Oil

E. Commercial Item Description (CID):
A-A-378.....Putty, Linseed Oil Type (For Wood Sash Glazing) (cancelled)
A-A-1272.....Plaster, Gypsum (Spackling Compound)
A-A-1555.....Water Paint, Powder (Cementitious, White and Colors) (WPC) (cancelled)
A-A-2335.....Sealer, Surface (Varnish Type, Wood and Cork Floors) (cancelled)
A-A-3120.....Paint, For Swimming Pools (RF) (cancelled)

F. Federal Specifications (Fed Spec):
P-W-155C.....Wax Floor, Water-Emulsion INT AMD 1
TT-F-322D.....Filler, Two-Component Type, For Dents, Cracks
INT AMD 1.....Small-Hole and Blow-Holes
TT-F-340C.....Filler, Wood, Plastic
TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

G. Master Painters Institute (MPI):
No. 1.....Aluminum Paint (AP)
No. 4.....Interior/ Exterior Latex Block Filler
No. 5.....Exterior Alkyd Wood Primer

No. 7.....Exterior Oil Wood Primer
No. 8.....Exterior Alkyd, Flat (EO)
No. 9.....Exterior Alkyd Enamel (EO)
No. 10.....Exterior Latex, Flat (AE)
No. 11.....Exterior Latex, Semi-Gloss (AE)
No. 18.....Organic Zinc Rich Coating
No. 22.....High Heat Resistant Coating (HR)
No. 26.....Cementitious Galvanized Metal Primer
No. 27.....Exterior / Interior Alkyd Floor Enamel, Gloss (FE)
No. 31.....Polyurethane, Moisture Cured, Clear Gloss (PV)
No. 36.....Knot Sealer
No. 43.....Interior Satin Latex
No. 44.....Interior Low Sheen Latex
No. 45.....Interior Primer Sealer
No. 46.....Interior Enamel Undercoat
No. 47.....Interior Alkyd, Semi-Gloss (AK)
No. 48.....Interior Alkyd, Gloss (AK)
No. 49.....Interior Alkyd, Flat (AK)
No. 50.....Interior Latex Primer Sealer
No. 51.....Interior Alkyd, Eggshell
No. 52.....Interior Latex, MPI Gloss Level 3 (LE)
No. 53.....Interior Latex, Flat, MPI Gloss Level 1 (LE)
No. 54.....Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)
No. 59.....Interior/Exterior Alkyd Porch & Floor Enamel, Low Gloss (FE)
No. 60.....Interior/Exterior Latex Porch & Floor Paint, Low Gloss
No. 66.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved) (FC)
No. 67.....Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR)
No. 68.....Interior/ Exterior Latex Porch & Floor Paint, Gloss
No. 71.....Polyurethane, Moisture Cured, Clear, Flat (PV)
No. 77.....Epoxy Cold Cured, Gloss (EC)
No. 79.....Marine Alkyd Metal Primer
No. 90.....Interior Wood Stain, Semi-Transparent (WS)
No. 91.....Wood Filler Paste
No. 94.....Exterior Alkyd, Semi-Gloss (EO)
No. 95.....Fast Drying Metal Primer

No. 98.....High Build Epoxy Coating
No. 101.....Cold Curing Epoxy Primer
No. 108.....High Build Epoxy Marine Coating (EC)
No. 114.....Interior Latex, Gloss (LE) and (LG)
No. 119.....Exterior Latex, High Gloss (acrylic) (AE)
No. MPI 135.....Non-Cementitious Galvanized Primer
No. 138.....Interior High Performance Latex, MPI Gloss Level 2 (LF)
No. 139.....Interior High Performance Latex, MPI Gloss Level 3 (LL)
No. 140.....Interior High Performance Latex, MPI Gloss Level 4
No. 141.....Interior High Performance Latex (SG) MPI Gloss Level 5

H. Steel Structures Painting Council (SSPC):
SSPC SP 1.....Solvent Cleaning
SSPC SP 2.....Hand Tool Cleaning
SSPC SP 3.....Power Tool Cleaning

I. Western Wood Products Association (WWPA):
Research Note 312- Revised Jan 30, 1985 Painting Over Knots

PART 2 – PRODUCTS

2.1 MATERIALS

A. Floor Wax: Fed Spec P-W-155 (Wax Floor, Water-Emulsion).
B. Putty: Fed Spec A-A-378, Type II (Putty, Linseed Oil Type).
C. Wood Sealer: MPI 31 (gloss) or MPI 71 (flat) thinned with thinner recommended by manufacturer at rate of about one part of thinner to four parts of varnish.
D. Identity markers options:
   1. Pressure sensitive vinyl markers.
   2. Snap-on coil plastic markers.
E. Aluminum Paint (AP): MPI 1.
F. Interior/Exterior Latex Block Filler: MPI 4.
G. Organic Zinc rich Coating (HR): MPI 22.
H. High Heat Resistant Coating (HR): MPI 22.
I. Cementitious Galvanized Metal Primer: MPI 26.
J. Exterior/ interior Alkyd Floor Enamel, Gloss (FE): MPI 27.
K. Knot Sealer: MPI 36.
L. Interior Satin Latex: MPI 43.
M. Interior Low Sheen Latex: MPI 44.
N. Interior Primer Sealer: MPI 45.

O. Interior Enamel Undercoat: MPI 47.
P. Interior Alkyd, Semi-Gloss (AK): MPI 47.
Q. Interior Alkyd, Gloss (AK): MPI 49.
R. Interior Latex Primer Sealer: MPI 50.
S. Interior Alkyd, Eggshell: MPI 51
T. Interior Latex, MPI Gloss Level 3 (LE): MPI 52.
U. Interior Latex, Flat, MPI Gloss Level 1 (LE): MPI 53.
V. Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE): MPI 54.
W. Interior / Exterior Alkyd Porch & Floor Enamel, Low Gloss (FE): MPI 59.
X. Interior/ Exterior Latex Porch & Floor Paint, Low Gloss: MPI 60.
Y. Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved) (FC): MPI 66.
Z. Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR): MPI 67.
AA. Interior/ Exterior Latex Porch & Floor Paint, gloss: MPI 68.
BB. Epoxy Cold Cured, Gloss (EC): MPI 77.
CC. Marine Alkyd Metal primer: MPI 79.
DD. Interior Wood Stain, Semi-Transparent (WS): MPI 90.
EE. Wood Filler Paste: MPI 91.
FF. Fast Drying Metal Primer: MPI 95.
GG. Cold Curing Epoxy Primer: MPI 101.
HH. Interior latex, Gloss (LE) and (LG): MPI 114.
II. Waterborne Galvanized Primer: MPI 134.
JJ. Non-Cementitious Galvanized Primer: MPI 135.
KK. Interior High Performance Latex, MPI Gloss Level 2(LF): MPI 138.
LL. Interior High Performance Latex, MPI Gloss Level 3 (LL): MPI 139.
MM. Interior High Performance Latex, MPI Gloss Level 4: MPI 140.
NN. Interior High Performance Latex (SG), MPI Gloss Level 5: MPI 141.

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.

2.3 REGULATORY REQUIREMENTS

A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
   1. Volatile Organic Compounds (VOC): VOC content of paint materials shall not exceed local, state or district requirements.
   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.

3. Asbestos: Materials shall not contain asbestos.
4. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
5. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.

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 days 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 Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
2. Maintain interior temperatures until paint dries hard.
3. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
4. 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 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:

1. Remove pre-finished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
3. See other sections of specifications for specified surface conditions and prime coat.
4. Clean surfaces for painting 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.

C. 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 TT-F-340C (Filler, Wood, Plastic) or A-A-378 (Putty, Linseed Oil Type). Use TT-F-340C (Filler, Wood, Plastic) for transparent finish, to match wood. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply TT-340C (Filler, Wood, Plastic) or A-A-378 (Putty, Linseed Oil Type) 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.

D. 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). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
   a. This includes 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.

E. Zinc-Coated (Galvanized) Metal 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.

F. 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 [Plaster, Gypsum (Spackling Compound) 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.

3.3 PAINT PREPARATION

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.

B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.

C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.

D. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.

E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.4 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 coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.

C. Apply each coat evenly and cover substrate completely.

D. Allow not less than 48 hours between applications of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.

E. Finish surfaces to show solid even color, free from runs, lumps, brush marks, laps, holidays, or other defects.

F. Apply by brush, roller or spray, except as otherwise specified.

G. Do not spray paint in existing occupied spaces unless approved by Resident Engineer, except in spaces sealed from existing occupied spaces.

1. Apply painting materials specifically required by manufacturer to be applied by spraying.
2. In areas, 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 WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar pre-finished items.

I. 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.

3.5 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 rebates 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 (WS)) 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 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 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 (ULC Approved) (FR) to wood for fire retardant finish.

F. Metals except boilers, incinerator stacks, and engine exhaust pipes:

1. Steel and iron: MPI 79 (Marine Alkyd Metal Primer). Use MPI 101 (Cold Curing Epoxy Primer) where MPI 77 (Epoxy Cold Cured, Gloss (EC) 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. Terne Metal: MPI 79 (Marine Alkyd Metal Primer).
5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel (EO)).
7. Asphalt coated metal: MPI 1 (Aluminum Paint (AP)).
8. Metal over 94 degrees C. (200 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating (HR)).

G. Gypsum Board:
1. Surfaces scheduled to have MPI 10 (Exterior Latex, Flat (AE)
2. Primer: MPI 50(Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer).
3. Surfaces scheduled to receive vinyl coated fabric wall covering: Use MPI 45 (Interior Primer Sealer).
4. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 77 (Epoxy Cold Cured, Gloss (EC)).

H. Gypsum Plaster and Veneer Plaster:
1. Surfaces scheduled to receive vinyl coated fabric wall-covering: Use MPI 45 (Interior Primer Sealer).
2. MPI 45 (Interior Primer Sealer), except use MPI 50 (Interior Latex Primer Sealer) when an alkyd flat finish is specified.

3.7 INTERIOR FINISHES

A. Apply following finish coats over prime coats in spaces and/or as scheduled.

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 coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) unless specified otherwise.
   b. Two coats of MPI 48 (Interior Alkyd Gloss (AK).
   c. One coat of MPI 46 (Interior Enamel Undercoat) plus one coat of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) on exposed interior surfaces of alkyd-amine enamel prime finished windows.
   d. Two coats of CID-A-A3120 Type E (RP) on exposed surfaces in pool area and chlorinator rooms.
   e. Machinery: One coat MPI 9 (Exterior Alkyd Enamel (EO)).
   f. Asphalt Coated Metal: One coat MPI 1 (Aluminum Paint (AP)).

g. Ferrous Metal over 94 degrees K (200 degrees F): Boilers, Incinerator Stacks, and Engine Exhaust Pipes: One coat MPI 22 (High Heat Resistant Coating (HR).

C. Gypsum Board:
1. One coat of MPI 45 (Interior Primer Sealer), plus one coat of MPI 139 (Interior High Performance Latex, MPI Gloss level 3 (LL)).
2. Two coats of MPI 138 (Interior High Performance Latex, MPI Gloss Level 2 (LF)).
3. One coat of MPI 45 (Interior Primer Sealer), plus one coat of MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)) or MPI 114 (Interior Latex, Gloss (LE) and (LG)).
4. One coat of MPI 45 (Interior Primer Sealer), plus one coat of MPI 48 (Interior Alkyd Gloss (AK)).

D. Plaster:
1. One coat of MPI 45 (Interior Primer Sealer), plus one coat of MPI 139 (Interior High Performance Latex, MPI Gloss level 3 (LL)).
2. Two coats of MPI 51 (Interior Alkyd, Eggshell) (AK)).
3. One coat of MPI 45 (Interior Primer Sealer), plus one coat of 139 (Interior High Performance Latex, MPI Gloss level 3 (LL)).
4. One coat MPI 101 (Cold Curing Epoxy Prime (EC)).

E. Masonry and Concrete Walls:
1. Over MPI 4 (Interior/Exterior Latex Block Filler) on CMU surfaces.
2. Two coats of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)).
3. Two coats of MPI 138 (Interior High Performance Latex, MPI Gloss Level 2 (LF)).

F. 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. Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
   b. Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
   c. Sand as specified.
3. Paint Finish:

a. One coat of MPI 46 (Interior Enamel Undercoat), plus one coat of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) (SG).
b. One coat MPI 66 (Interior Alkyd Fire retardant, Clear Top-Coat (ULC Approved) (FC).
c. One coat of MPI 46 (Interior Enamel Undercoat), plus one coat of MPI 48 (Interior Alkyd Gloss (AK)).
d. Two coats of MPI 51 (Interior Alkyd, Eggshell) (AK)).

4. Transparent Finishes on Wood Except Floors.
   a. Natural Finish:
      1) One coat of sealer as written in 2.1 E.
      2) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV), or MPI 31 (Polyurethane, Moisture Cured, Clear Gloss (PV).
   b. Stain Finish:
      1) One coat of MPI 90 (Interior Wood Stain, Semi-Transparent (WS)).
      2) Use wood stain of type and color required to achieve finish specified. Do not use varnish type stains.
      3) One coat of sealer as written in 2.1 E.
      4) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV), or MPI 31 (Polyurethane Moisture Cured, Clear Gloss (PV)).
   c. Varnish Finish:
      1) One coat of sealer as written in 2.1 E.
      2) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV), or MPI 31 (Polyurethane Moisture Cured, Clear Gloss (PV)).
   d. MPI 66 (Interior Alkyd Fire Retardant, Clear Top-Coat(ULC Approved) (FC)) Intumescent Type, Fire Retardant Coating (FC) where scheduled: Two coats.

G. Cement Board: One coat of MPI 138 (Interior High Performance Latex, MPI Gloss Level 2 (LF)).

H. Concrete Floors: One coat of MPI 68 (Interior/ Exterior Latex Porch & Floor Paint, Gloss (FE)).

I. Miscellaneous:
   1. MPI 1 (Aluminum Paint): Two coats of aluminum paint.
   2. Gold Paint (GP): Two coats of gold 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.
      b. Mineral fiber units: One coat of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)).

c. Units of organic fiber or other material not having a class A rating: One coat of MPI 66 (Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved) (FC)) fire retardant paint.

4. Interstitial floor markings: One coat MPI 27 (Exterior/ Interior Alkyd Floor Enamel, Gloss (FE)).

3.8 REFINISHING EXISTING PAINTED SURFACES

A. Clean, patch and repair existing surfaces as specified under surface preparation.

B. Remove and reinstall items as specified under surface preparation.

C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.

D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

F. In existing rooms and areas where alterations occur, clean existing stained and natural finished wood retouch abraded surfaces and then give entire surface one coat of MPI 31 (Polyurethane, Moisture Cured, Clear Gloss), or MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV)).

G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

H. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.

I. Sand or dull glossy surfaces prior to painting.

J. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.9 PAINT COLOR

A. Color and gloss of finish coats is specified in drawings.

B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.

C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.

2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.10 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, paint as specified.

C. Paint various systems specified in Divisions 2,22,23.

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 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 especially on electrical conduit containing feeders 600 volts or more.

G. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.

H. Color:

1. Paint items having no color specified to match surrounding surfaces.
2. Paint colors as specified, 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. Use Glid-Guard #4510 or approved equal acceptable to the COTR.

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. Interior Locations:
   a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) to following items:
      1) Metal under 94 degrees C (200 degrees F) of items such as bare piping, fittings, hangers and supports.
      2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
      3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
   b. Ferrous metal exposed in hydrotherapy equipment room and chlorinator room of water and sewerage treatment plants: One coat of MPI 101 (Cold Curing Epoxy Primer) and one coat of MPI 98 (High Build Epoxy Coating)).
   c. Apply one coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)) on finish of insulation on boiler breeching and uptakes inside boiler house, drums, drumheads, oil heaters, feed water heaters, tanks and piping.
   d. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 94 degrees K (200 degrees F) of following items:
      1) Garbage and trash incinerator.
      2) Medical waste incinerator.
      3) Exterior of boilers and ferrous metal in connection with boiler settings including supporting members, doors and door frames and fuel oil burning equipment.
      4) Steam line flanges, bare pipe, fittings, valves, hangers and supports over 94 degrees K (200 degrees F).
      5) Engine generator exhaust piping and muffler.
   e. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 9 (Exterior Alkyd Enamel (EO)) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

2. Other exposed locations:
   a. Metal surfaces, except aluminum, of cooling towers exposed to view, including connected pipes, rails, and ladders: Two coats of MPI 1 (Aluminum Paint (AP)).
   b. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 119 (Exterior Latex, High Gloss (acrylic)(AE)).

J. Legends:
For electrical Conduits and pull boxes containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. For conduit, provide legends where conduits pass through walls and floors and at maximum 6100 mm (20 foot) intervals in between. Use labels with yellow background with black border and the words **Danger High Voltage Class, 15000-volts.** For pull boxes, provide a legend on the front cover. Use labels the same size as for conduit with the words **Danger High Voltage – Keep Out.**

3.11 BUILDING AND STRUCTURAL WORK FIELD PAINTING

A. Painting and finishing of interior and exterior work except as specified under paragraph 3.11 B.
   1. Painting and finishing of new and/or existing work including colors and gloss of finish selected is specified in finish schedule.
   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. Pre-finished 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. Gypsum board walls must have primer sealer applied to them.
   b. Inside walls or other spaces behind access doors or panels.
   c. Surfaces concealed behind permanently installed casework and equipment. However, primer sealer must be applied to these surfaces prior to installation of casework.
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., Inchcape Testing Services, Inc., or Factory Mutual Research Corporation.
   b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
   a. Gas Storage Racks.
   b. Except where specifically specified to be painted.
8. Gaskets.
9. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Structural steel encased in concrete, masonry, or other enclosure.
11. Structural steel to receive sprayed-on fire proofing.
12. Ceilings, walls, columns in interstitial spaces.
13. Ceilings, walls, and columns in pipe basements.

3.12 IDENTITY PAINTING SCHEDULE

A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.
   1. Legend may be identified using 2.1 G options or by 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 3,048

mm (10 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.
5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on drawings 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 BBREVIATIONS
Blow-off		Yellow	Black	Blow-off
Boiler Feedwater		Yellow	Black	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		Yellow	Black	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Yellow	Black	H.P. _____*
High Pressure Condensate Return		Yellow	Black	H.P. Ret ____*
Medium Pressure Steam		Yellow	Black	M. P. Stm ____*
Medium Pressure Condensate Return		Yellow	Black	M.P. Ret _____*
Low Pressure Steam		Yellow	Black	L.P. Stm _____*
Low Pressure Condensate Return		Yellow	Black	L.P. Ret _____*
High Temperature Water Supply		Yellow	Black	H. Temp Wtr Sup
High Temperature Water Return		Yellow	Black	H. Temp Wtr Ret
Hot Water Heating Supply		Yellow	Black	H. W. Htg Sup
Hot Water Heating Return		Yellow	Black	H. W. Htg Ret
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Vacuum Condensate Return		Yellow	Black	Vac Cond Ret
Fuel Oil - Grade		Green	White	Fuel Oil-Grade __*

Boiler Water Sampling		Yellow	Black	Sample
Chemical Feed		Yellow	Black	Chem Feed
Continuous Blow-Down		Yellow	Black	Cont. B D
Pumped Condensate		Black		Pump Cond
Pump Re-circulating		Yellow	Black	Pump-Recirc.
Vent Line		Yellow	Black	Vent
Alkali		Yellow	Black	Alk
Bleach		Yellow	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		Yellow	Black	Acid Waste
Vent		Yellow	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	White	Auto Spr
Standpipe		Red	White	Stand
Sprinkler		Red	White	Drain

Hot Water Supply Domestic/Solar Water	H.W. Sup Dom/SW
Hot Water Return Domestic/Solar Water	H.W. Ret Dom/SW

7. Electrical Conduits containing feeders over 600 volts, paint legends using 51 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 3,048 mm (10 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 15000-volts.
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.

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 PARTITION" or, "FIRE PARTITION" as applicable.
3. Locate not more than 3,048 mm (10 feet) on center on corridor sides and room sides of partitions, and with a least one 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 shown.
2. Paint numbers and letters 102 mm (4 inches) high, locate 457 mm (18 inches) below overhead structural slab.
3. Apply on four 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.

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APPENDIX

Coordinate the following abbreviations used in SECTION 09900/09900R, PAINTING, with other Sections, especially 09050, INTERIOR EXTERIOR FINISHES, MATERIALS AND FINISH SCHEDULES, 09050R, COLOR DESIGN, and other COATING SECTIONS listed. Use the same abbreviation and terms consistently.

Paint or coating Abbreviation
Acrylic Emulsion AE (MPI 10 – flat/MPI 11 – semi-gloss/MPI 119 - gloss)
Alkyd Flat Ak (MPI 49)
Alkyd Gloss Enamel G (MPI 48)
Alkyd Semi-gloss Enamel SG (MPI 47)
Aluminum Paint AP (MPI 1)
Cementitious Paint CEP (TT-P-1411)
Exterior Latex EL??(MPI 10 / 11 / 119)??
Exterior Oil EO (MPI 9 – gloss/MPI 8 – flat/MPI 94 – semi-gloss)
Epoxy Coating EC (MPI 77 – walls, floors/MPI 108 – CMU, concrete)
Fire Retardant Paint FR (MPI 67)
Fire Retardant Coating (Clear) FC (MPI 66, intumescent type)
Floor Enamel FE (MPI 27 – gloss/MPI 59 – eggshell)
Heat Resistant Paint HR (MPI 22)
Latex Emulsion LE (MPI 53, flat/MPI 52, eggshell/MPI 54, semi-gloss/MPI 114, gloss
Latex Flat LF (MPI 138)
Latex Gloss LG (MPI 114)
Latex Semi-gloss SG (MPI 141)
Latex Low Luster LL (MPI 139)
Plastic Floor Coating PL
Polyurethane Varnish PV (MPI 31 – gloss/MPI 71 - flat)
Rubber Paint RF (CID-A-A-3120 - Paint for Swimming Pools (RF)).
Water Paint, Cement WPC (CID-A-A-1555 - Water Paint, Powder).
Wood Stain WS (MPI 90)

Verify abbreviations used in the following coating Sections and new sections developed in MASTERFORMAT Section 09800 series for conflicts with other abbreviations used for materials and finishes.

Section 09815, HIGH BUILD GLAZED COATING GC
Section 09836, MULTI COLOR COATING MC

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SECTION 10 11 13
MARKERBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies markerboards and related items.

B. Boards shall be factory assembled.

C. Where shown, assemble either chalkboards or markerboards with tackboards into a single unit.

1.2 QUALITY ASSURANCE

Boards shall be the products of one manufacturer.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Shop Drawings: Identifying all parts by name and material and showing design, construction, installation, anchorage and relation to adjacent construction.

C. Manufacturer's Literature and Data:

1. Markerboard.

D. Samples:

1. Markerboard writing surface, 300 by 300 mm (six by six inches), each color, mounted on backing.
2. Integrally colored anodized aluminum, 300 mm (six inch) length.
3. Each accessory (after approval, may be used in the work).

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

AMP 500 Series.....Metal Finishes Manual

AMP 501.....Finishes for Aluminum

C. American National Standards (ANSI):

Z97.1-04.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-06.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

C1036-06.....Flat Glass

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

F104-03.....Nonmetallic Gasket Materials

E. Composite Panel Association (CPA):

A208.1-06.....Particleboard

A135.4-04.....Basic Hardboard

PART 2 - PRODUCTS

2.1 MATERIALS

A. Marker Board

1. Magnetic porcelain – enameled face sheet: Balanced, high-pressure, factory-laminated marker board assembly of three-ply construction consisting of backing sheet, core material, and .021-inch thick magnetic porcelain enamel face sheet with low gloss, no ghost finish.
2. Frame (trim): Extruded aluminum, 1.5 mm (.060-inch) thick, snap0on type, approximate face width 44mm (1-3/4 inch), depth and configuration as required to return to wall and engage clips.
3. Marker Tray: Approximate 2-3/4 inch extruded aluminum tray. Extend to full length of marker board.

2.2 FABRICATION

A. Porcelain-Enamel Visual Display Assembly: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible waterproof adhesive.

B. Factory assemble visual display boards unless otherwise indicated. Trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.

C. Marker boards and tack boards 3660 mm (12 feet) or less in length shall be in one piece

D. Finish exposed aluminum surfaces as follows:

1. AA 45 chemically etched medium matte, with clear anodic coating Class II Architectural, 0.4 mils thick (AA-M12C22A32).
2. AA 45 chemically etched medium matte, with integrally colored anodic coating, Class II Architectural, 0.4 mils thick (AA-M12C22A32, of color to match approved sample).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install units in accordance with the manufacturer's installation instructions, use concealed fasteners.

B. Inspect surfaces and related construction to receive units. Partitions shall have reinforcing to receive fasteners. Verify type and placement of reinforcement.

C. Do not proceed with the installation until reinforcement is in place and surfaces are flat.

D. Assemble units as specified by the manufacturer.

3.2 INSTALLATION OF MARKERBOARDS

A. Mount board with adhesive and blocking pads spaced 16 inches on center each way.

B. Grounds designed to receive clips for snap-on trim shall be continuous and be secured 300 mm (12 inches) on center. Space clips 300 mm (12 inches) on center.

C. Miter trim at corners, conceal fasteners. Modify trim as required to conform to surrounding construction details.

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SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior signage for rooms and code required signs.

B. Refer to drawings for sign types & details, coordinate with Medical Center for all sign text, colors, room numbers, and any special requirements.

C. Interior Signage: Provide new permanent room signage on all rooms within the area of work. Where existing walls are scheduled to remain, remove and reinstall the signage. Entrances to the new Specialty Treatment area shall receive new signage.

D. Coordinate interior signage with current VA Signage Design Guide.

E. Provide all signs to meet ADA guidelines.

1.2 RELATED WORK

A. 01 58 16: Temporary Interior Signage

1.3 MANUFACTURER'S QUALIFICATIONS

Sign manufacturer shall provide evidence that they regularly and presently manufacturers signs similar to those specified in this section as one of their principal products.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Samples: Sign panels and frames, with letters and symbols, each type. Submit 2 sets. One set of samples will be retained by Resident Engineer, other returned to Contractor.

1. Sign Panel, 200 mm x 250 mm (8 inches x 10 inches), with letters.
2. Color samples of each color, 150 mm x 150 mm (6 inches x 6 inches. Show anticipated range of color and texture.
3. Sample of typeface, arrow and symbols in a typical full size layout.

C. Manufacturer's Literature:

1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
2. Manufacturer's printed specifications, anchorage details, installation and maintenance instructions.

D. Samples: Sign location plan, showing location, type and total number of signs required.

E. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.

1.5 DELIVERY AND STORAGE

A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.

B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.

C. Deliver signs only when the site and mounting services are ready for installation work to proceed.

D. Store products in dry condition inside enclosed facilities.

1.6 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):
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and tubes.

C. Federal Specifications (Fed Spec):
MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified.
MIL-P-46144C.....Plastic Sheet, Polycarbonate

1.7 MINIMUM SIGN REQUIREMENTS

A. Permanent Rooms and Spaces:

1. Tactile and Braille Characters, raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.
2. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed and Helvetica Regular.
3. Character Height: Minimum 16 mm (5/8 in) high, Maximum 50 mm (2 in).
4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.
5. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
6. Mounting Location and Height: As shown. Mounted on wall adjacent to the latch side of the door and to avoid door swing and protruding objects.

PART 2 – PRODUCTS

2.1 GENERAL

A. Signs of type, size and design shown on the drawings and as specified.

B. The sign types shown on drawings depict the actual existing signs installed elsewhere in the same building. It is the Sign Contractor's responsibility to visit the site and provide the same type of signage (size, type, material, design, font, color, features) .

C. Signs complete with lettering, framing and related components for a complete installation.

D. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

E. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Resident Engineer to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.

F. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

2.2 PRODUCTS

A. Aluminum:

1. Sheet and Plate: ASTM B209.
2. Extrusions and Tubing: ASTM B221.

B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic shall not be acceptable.

C. Polycarbonate: MIL-P-46144C; Type I, class 1.

D. Vinyl: 0.1 mm thick machine cut, having a pressure sensitive adhesive and integral colors.

2.3 SIGN STANDARDS

A. Topography:

1. Type Style: Refer to drawings. Initial caps or all caps as indicated in Sign Message Schedule.
2. Arrow: See graphic standards in drawings.
3. Letter spacing: See graphic standards on drawings.

4. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Coordinate final text copy with VA.

2.4 SIGN TYPES

A. Refer to drawings.
   1. The interior sign system is comprised of sign types families that are presently installed elsewhere in the same building.
   2. The exterior non-illuminated sign system shall be comprised of sign types families that are located on the West side of building.

B. Interchangeable Component System:
   1. Sign Type Families that are presently installed elsewhere in the same building.
   2. Interior sign system capable of being arranged in a variety of configurations with a minimum of attachments, devices and connectors.

2.5 FABRICATION

A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.

B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.

C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.

D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.

E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.

F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth su1rfaces.

G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.

H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.

I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.
J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
K. Movable parts, including hardware, are be cleaned and adjusted to operate as designed without binding of deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Resident Engineer & forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.
B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact Resident Engineer for clarification.
C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.
D. Remove or correct signs or installation work Resident Engineer determines as unsafe or as an unsafe condition.

E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.
F. Locate signs as shown on the approved, GC provided Sign Location Plan.
G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.
H. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.
I. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

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SECTION 10 21 23
CUBICLE CURTAIN AND TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies curtains and tracks assembly.

B. Refer to drawings for locations.

1.2 RELATED WORK

A. Steel shapes for suspending track assembly: Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:
One 300 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

D. Manufacturer's Literature and Data:
Cubicle curtain track and curtain

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location. Store so as to not bend or warp the tracks.

C. Do not open packages until contents are needed for installation, unless verification inspection is required.

1.5 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):
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
B456-03.....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS

A. Surface mounted, suspended type:

1. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.

B. Curtain Carriers: Nylon or delrin carriers, with either nylon or delrin wheels on metal, delrin, or nylon axles. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain and hook assembly, or delrin carriers may have moulded on delrin hooks. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel. Provide 2.2 carriers for every 300 mm (one foot) of each section of each track length, plus one additional carrier.

C. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.

D. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.

E. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Any operating mechanism shall be removable with common tools.

2.2 CURTAINS

A. Made with inherent fire retardant material that is durable, safe, and lasts throughout the lifetime of the cubicle curtain.

B. The top FR nylon mesh with ½" opening woven – color as indicated in drawings, snag free header, combined with #2 grommet.

C. Curtain to have mesh top to allow for air movement.

D. Size of curtain shall be from ceiling to 14" above the finish floor.

E. Curtain material: Refer to drawings.

2.3 FASTENERS

A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.

B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized (except in high moisture areas use stainless steel).

C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

2.4 FINISHES

A. Aluminum: Finish numbers for aluminum specified are in accordance with The Aluminum Association's Designation System. AA-C22A31 finish Chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mils thick .

2.5 FABRICATION

A. Weld and grind smooth joints of fabricated components.
B. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4800 mm (16 feet) without joints. Form corner bend on a 300 mm (12 inch) radius.
C. Provide steel anchor plates, supports, and anchors for securing components to building construction.
D. Form flat surface without distortion.
E. Shop assemble components and package complete with anchors and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install tracks after finish painting and ceiling finishing operations are complete.
B. Install track level and hangers plumb and securely anchor to the ceiling or suspend from above to form a rigid installation.
C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 600 mm (24 inches) on center.
D. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 3 mm (1/8-inch) diameter fastenings or concealed clips spaced not more than 900 mm (three feet) on center.
E. Install suspended track seven feet, three inches above the finished floor, with hangers spaced no more than four feet on center. At ceiling line, provide flange fittings secured to hangers with set screws. Secure track to walls with flanged fittings and to hangers with special fittings.
F. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.
G. Anchor surface mounted intravenous track directly to support system above ceiling as shown.
H. Remove damaged or defective components and replace with new components or repair to the original condition.

3.2 ACCEPTANCE

A. Track shall be installed neat, rigid, plumb, level and true, and securely anchored to the overhead construction.

B. Carrier units shall operate smoothly and easily over the full range of travel.

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SECTION 10 25 13
PATIENT BED SERVICE WALLS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation and connection of the vertical patient wall systems. Patient wall systems are also referred to as prefabricated bedside patient units or PBPUs.

B. Refer to drawings for layout and additional requirements.

C. Verify with VA Project Manager for feature requirements.

1.2 RELATED WORK

A. Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES AND Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES: Requirements for air, oxygen and vacuum outlets in the patient wall units.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Raceways and outlet boxes for wiring.

D. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.

E. Section 26 27 26, WIRING DEVICES: Wiring devices to be installed in the patient wall units.

F. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.

G. Section 27 52 23, NURSE CALL/CODE BLUE SYSTEMS: Nurse Call and Code One requirements for installation in the patient wall units.

1.3 SUBMITTALS

A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting details, front view, side view, equipment and device arrangement, wiring diagrams, material, and connection diagrams.
3. Determine final layout of each style of patient wall system at this stage. Provide configuration drawings showing all possible device (nurse call, medical gases, electrical receptacles and switches,

etc.) locations to the Resident Engineer. The Resident Engineer will provide by return of submittal the desired configuration of each style of patient wall system. Limit the number and type of devices allowed for each style of unit to the number and type of devices specified below.

C. Manuals: Two weeks prior to the final inspection, deliver four copies of the following to the Resident Engineer.
   1. Complete maintenance and operating manuals including wiring diagrams, technical data sheets, and information for ordering replacement parts:
      a. Include complete "As installed" diagrams which indicate all items of equipment, their interconnecting wiring and interconnecting piping.
      b. Include complete diagrams of the internal wiring for each of the items of equipment, including "As installed" revisions of the diagrams.
      c. Identify terminals on the wiring diagrams to facilitate installation, maintenance and operation.

D. Certifications: Two weeks prior to the final inspection, deliver four copies of the following certifications to the Resident Engineer:
   1. Certification by the manufacturer that the equipment conforms to the requirements of the drawings and specifications.
   2. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested in accordance with the manufacturer's recommendations.

1.4 APPLICABLE PUBLICATIONS:

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in text by the basic designation only.

B. National Fire Protection Association (NFPA):
   70 (current edition)....National Electrical Code (NEC)
   99-05.....Health Care Facilities

C. Underwriters Laboratories, Inc. (UL):
   UL listed in product category SECTIONS AND UNITS (QQXX). This standard used to investigate listed products in this category is NFPA 70 (NEC).

PART 2 - PRODUCTS

2.1 PATIENT WALL SYSTEMS

A. Shall be UL listed.

B. Shall consist of a structural framework, removable panels and removable equipment console units, factory assembled to house all permanent bedside services including but not necessarily limited to fixtures, grounding jacks, power outlets, telephone outlet, nurses call patient station, medical gas outlet(s), accessories, and other fittings or devices.

C. Shall conform to the following:
   1. Applicable requirements in NFPA 70 (NEC) and NFPA 99.
   2. Assembly and all components shall be UL listed or labeled.

D. Coordinate the mounting space provisions for the nurse call equipment with Section 27 52 23, NURSE CALL/CODE BLUE SYSTEMS.

E. Compressed Air, Oxygen and Vacuum System Equipment: Furnish, install and test the equipment in accordance with the drawings and Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
   1. Fixed medical gas outlets are permanently installed in one location and may not be moved without special tools and shutting off the gas involved.
   2. Movable medical gas outlets:
      a. Hose connected to gas manifold type:
         1) The hoses connected to gas manifold shall be UL listed and labeled for the purpose.
         2) All hoses shall be accessible at all times. Use bars or other restraining devices to control exposed hoses. A panel may cover the hoses provided it can be easily removed with out the use of special tools for hose inspection.
      b. Relocatable type:
         1) Relocatable (snap-in) without the use of tools to any one of several different fixed locations.
         2) Appropriate relocatable adapter can be used to access available gases from each fixed location.
         3) Cover all unused locations with a blank (no gas) adapter plate.

F. Electrical receptacles and switches shall comply with the requirements in Section 26 27 26, WIRING DEVICES; grounding in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS; and internal wiring in Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

G. Style B1: Single bed patient wall system consisting of 3" recessed dual vertical units equal to Axiom Patient Care Headwall as manufactured by Hospital Systems, Inc. The vertical units shall connect to the above

ceiling junction boxes and gas connection points. The width of the vertical unit shall not be less than 419 mm (16.5 inches) nominal. All electrical devices shall be wired in accordance with the schematic diagram shown on the drawings.

a. Provide oxygen gas outlets: 4-each fixed or 2-each movable.
b. Provide air outlets: 4-each fixed or 2-each movable.
c. Provide vacuum outlets: 6-each fixed or 3-each movable.
d. Provide emergency power outlets: 2-each NEMA 20R single receptacles, self illuminated red with stainless steel or anodized aluminum cover plates, engraved "EMERGENCY POWER" with minimum 6 mm (1/4 inch) red filled letters.
e. Provide normal power outlets: 5-each NEMA 20R single white receptacles. One of which is for the bed motor. Provide stainless steel or anodized aluminum cover plates.
f. Provide a Nurses Call audio-visual single bed station.
g. Provide Tele-cart jack.
h. Provide cable jack
i. Provide an auxiliary light (6 to 7 watts) with hood and switch. Both shall be mounted on a stainless steel or an anodized aluminum faceplate installed in a single gang box.
j. Provide telephone jack
k. Provide a switch for the overhead/exam light.
k. Provide accessories listed below along with all required components as required for fully operable, complete installation. Verify all accessory quantities and types with VA Project Manager:
    1. Medical Rail System with vertical equipment channels
    2. Baskets & shelves
    3. Track mounting assembly parts kit
    4. Vacuum bottle slide

H. All units shall have the following features:

1. Basic structural framework shall be constructed of heavy gage extruded aluminum or minimum 1.9 mm (14 gage) cold-rolled steel, designed to be a self-supporting unit for above-the-floor, for close wall mounting or a freestanding installation. For freestanding units, provide the framework with a base plate and overhead structural supports.
2. Drill and tap the side frame members to permit the installation of front panel devices at modular intervals at any elevation between the top and bottom.
3. Provide removable front panels:

a. Construct panel of the following materials:
   1) Fire retarding core material surfaced with a high pressure plastic laminated facing sheet.
   2) Vinyl material heat and pressure applied over a minimum of 1.6 mm (0.060 inch) sheet aluminum back braced for rigidity and sound control.
   3) Vinyl material heat and pressure applied over sheet steel minimum 1.6 mm (0.060 inch).
   4) Vinyl material heat and pressure applied over sheet aluminum minimum 2.0 mm (0.080 inch).

b. Bond the panel edges with an aluminum extrusion or cold-rolled steel trim designed for mounting directly to the structural framework, thus allowing the panels to be easily removed for access to internal components and for servicing of utility connections or future modifications. Secure panels with hidden screws or other means to offer an overall finished appearance. All exposed metal surfaces or trims greater than 4 mm (1/8 inch) wide shall be of anodized aluminum or stainless steel finished to resist abrasion and affects from hospital cleaning compounds.

4. Units need not have enclosing back panels, provided they are edge gasketed to the wall or totally and inconspicuously edge sealed to the wall with a resilient caulking material. Attach side and back panels [sheet steel, a minimum of 1.6 mm (0.060 inch)] or equivalent strength aluminum side and back panels, with flush screws to permit close wall mounting. Finish side panels to match or compliment the front panels. Match back panel for free-standing units with the finish of the front and side panels.

5. Mount patient service components in an equipment console made up of a backbox and finish fascia.
   a. Use galvanized steel backbox with outlet gang openings on minimum 60 mm (2.4 inches) uniform centers to provide mounting supports of front panel devices. Provide removable metal barriers to separate voltage sources and to facilitate wiring between segregated devices within the same horizontal module.
   b. Match finish, either anodized aluminum or stainless steel of all fascia and device face plates.
   c. Fascia and/or face plates may be omitted for power and grounding receptacles in the consoles if the receptacles are mounted flush in the PBPU cover panel and facilities (support members, tapped

holes, spacing, etc.) are provided behind the panel for future addition or relocation of receptacles.

d. Provide smooth external surfaces having a finished appearance. Maintain adequate spacing of device plates and similar items to eliminate crevices and facilitate cleaning.

6. Provide patient services as indicated in paragraphs above, the schematic wiring diagram shown on drawings, and as follows:
   a. Electrical components: Factory assembled and prewired to a sectionalized junction box at the top of the unit in accordance with circuiting and switching arrangements shown on the drawings. Factory assembled prewiring may be stranded in sizes AWG #10 and #12. Provide an equipotential ground bus with lugs suitable for connecting AWG #14 to AWG #6 conductors with a minimum of 48 screw-type terminals, unless otherwise shown.
   b. Receptacles: Single Hospital Grade NEMA 5-20R, unless otherwise specified.
   c. Provide medical gas components compatible with those installed elsewhere in the project that are factory assembled, manifolded and pre-piped, using medical grade copper pipe, to single point connections of each service at the top of the units.
   d. Provide nurse call services consisting of provisions for adequate space and matching face plates for the equipment and empty conduit to the sectionalized junction box at the top of the unit.
   e. Provide internal power and signal wiring in separate EMT, flexible metal conduits or approved raceway. Separate normal power circuits from emergency power circuits. Also, provide adequate supports for conduits and piping within the structural frame.
   f. Telephone outlets/jacks: Plug-in type as approved by the VAMC.
   g. Except for anodized aluminum and galvanized or stainless steel surfaces, clean and paint all other metal surfaces at the factory with primer and not less than two coats of baked enamel.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Installation shall be in accordance with NFPA 70 (NEC), NFPA 99, and as shown on the drawings.

B. Compressed Air, Oxygen and Vacuum System Equipment:
   1. Install and test the equipment and piping system in accordance with the drawings and Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.

2. Install and make connections as required for a complete and operational patient wall system for each unit.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies wall guards (crash rails), corner guards, wall caps, door protection and high impact wall covering.

B. Coordinate with VA Project Manager for type required.

C. Refer to drawings for additional information.

1.2 RELATED WORK

A. Armor plates and kick plates not specified in Section 08 71 00, DOOR HARDWARE.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Wall Guards.
2. Corner Guards.
3. Door Protectors.
4. High Impact Wall covering

D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

1.4 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° C (70 degrees F) for at least 48 hours prior to installation.

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 Society for Testing and Materials (ASTM):

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

D256-06ae1.....Impact Resistance of Plastics

D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

E84-08a.....Surface Burning Characteristics of Building Materials

C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

D. National Fire Protection Association (NFPA):
80-07.....Standard for Fire Doors and Windows

E. Society of American Automotive Engineers (SAE):
J 1545-05.....Instrumental Color Difference Measurement for Exterior Finishes.

F. Underwriters Laboratories Inc. (UL):
Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A167, Type 302B.

B. Aluminum Extruded: ASTM B221, Alloy 6063, Temper T5 or T6. Aluminum alloy used for anodizing coating shall be as required to produce specified color.

C. Resilient Material:

1. Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements:

a. Minimum impact resistance of 1197 ps (25 ft lbs per sq.ft) when tested in accordance with ASTM D256 (Izod impact, ft.lbs. per inch notch).

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. Material shall be labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.

e. Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

f. Same finish on exposed surfaces.

2.2 CORNER GUARDS

A. Resilient, Shock-Absorbing Corner Guards, 48" tall mounted above wall base, Equal to SM-20 Series by C/S Group: Surface mounted type of 30 mm (1/4 inch radius), 6 mm 1/4-inch corner) formed to profile shown.

1. Snap-on corner guard formed from resilient material, minimum 2 mm (0.078-inch) thick, free floating on a continuous 1.6 mm (0.063-inch) thick extruded aluminum retainer. Design retainer used for flush mounted type to act as a stop for adjacent wall finish material. Provide appropriate mounting hardware, cushions and base plates as required.
2. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.
3. Flush mounted corner guards installed on any fire rated wall shall maintain the fire rating of the wall. Provide fire test of proposed corner guard system to verify compliance.
   a. Where insulating materials are an integral part of the corner guard system, the insulating materials shall be provided by the manufacturer of the corner guard system.
   b. All exposed metal in fire rated assemblies shall have a paintable finish.

2.3 WALL GUARDS

A. Resilient Wall Guards:
   1. Wall Guards (Crash Rails) equal to SCR-64E series by C/S Group with covers of resilient material, minimum 2.8 mm (0.110-inch) thick, shall be free-floated over 50 mm (two-inch) wide aluminum retainer clips, minimum 2.3 mm (0.090-inch) thick, anchored to wall at maximum 600 mm (24 inches) on center, supporting a continuous aluminum retainer, minimum 1.6 mm (0.062-inch) thick; or, shall be free-floated over a continuous extruded aluminum retainer, minimum 2.3 (0.090-inch) thick anchored to wall at maximum 600 mm (24 inches) on center.
   3. Provide wall guards (crash rails) with prefabricated and closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories as required. End caps and corners shall be field adjustable to assure close alignment with wall guards (crash rails). Screw or bolt closure caps to aluminum retainer.

2.4 DOOR PROTECTION

A. Equal to Door Protection Model SS-DP by C/S Group: Material shall be supplied precut with de-burred edges. Height to be 34" high at single doors and 44" high at double doors.
B. Field install using manufacturer's recommended water based contact cement.

C. Coordinate door protection material requirements with door and frame suppliers to insure fit for all components, and color as specified.

2.5 HIGH IMPACT WALL COVERING

A. Equal to 0.040" thick high impact Acrovyn vinyl acrylic wallcovering by C/S Group designed specially for interior use. Install 48"AFF above wall base material behind every Patient bed and spanning between the vertical head wall units.
B. Coordinate with door guard rail protection material and supplier for proper fit, installation and color.
C. Provide all wainscot trims and "H" joint moldings
D. Provide adhesive as recommended by the wall covering manufacturer.

2.6 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.
B. Where type, size, spacing or method of fastening is not shown or specified, submit shop drawings showing proposed installation details.

2.7 FINISH

A. In accordance with NAAMM AMP 500 series.
B. Aluminum:
   1. Exposed aluminum: AAC22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mil thick.
   2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.
C. Stainless Steel: NAAMM finish Number 4.
D. Resilient Material: refer to drawings.

PART 3 - INSTALLATION

3.1 RESILIENT CORNER GUARDS

A. Install corner guards on walls in accordance with manufacturer's instructions.

3.2 STAINLESS STEEL WALL GUARDS

A. Mount guards on external corners of interior walls, partitions and columns as shown.
B. Where corner guards are installed on walls, partitions or columns finished with plaster or ceramic tile, anchor corner guards as shown on drawings. Provide continuous 16 gage perforated, galvanized Z-shape steel anchors welded to back edges of corner guards and wired to metal

studs, expansion bolted to concrete or masonry with four 9.5 mm (3/8-inch) diameter bolts, spaced 400 mm (16 inches) on centers. Coat back surfaces of corner guards, where shown, with a non-flammable, sound deadening material. Corner guards shall overlap finish plaster surfaces.

1. Where corner guards are installed on exposed structural glazed facing tile units or masonry wall, partitions or columns, anchor corner guards as shown on the drawings , or anchor corner guards to existing walls with 6 mm (1/4-inch) oval head stainless steel countersunk expansion or toggle bolts , or anchor corner guards with four nominal 1.3 mm (0.0516-inch) thick, adjustable galvanized steel anchors, spaced as shown. Grout spaces solid between guards and backing with Portland cement and sand mortar.
2. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow to cure undisturbed for 24 hours.

3.3 RESILIENT WALL GUARDS (CRASH RAIL)

Secure guards to walls with mounting cushions brackets and fasteners in accordance with manufacturer's details and instructions.

3.4 STAINLESS STEEL WALL GUARDS

Space brackets at not more than three feet on centers and anchor to the wall in accordance with manufacturer's installation instructions.

3.5 DOOR PROTECTION AND HIGH IMPACT WALL COVERING

A. Surfaces to receive protection shall be clean, smooth and free of obstructions.
B. Install protectors after frames are in place but preceding installation of doors in accordance with approved shop drawings and manufacturers specific instructions.
C. Apply with adhesive in controlled environment according to manufacture's recommendations.
D. Protection installed on fire rated doors and frames shall be installed according to NFPA 80 and installation procedures listed in UL Building Materials Directory; or, equal listing by other approved independent testing laboratory establishing the procedures.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. Acrylic glazing: Section 08 80 00, GLAZING.

B. Field Painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

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

B. American Society of Testing and Materials (ASTM):
D4802-02.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

Recessed type with flat trim of size and design shown.

2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
2. Design doors to open 180 degrees.
3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

A. Finish interior of cabinet body with baked-on semigloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

B. Install cabinet so that bottom of cabinet is 975 mm (39 inches) above finished floor.

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SECTION 10 51 19
METAL LOCKERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal lockers.

1.02 MEASUREMENT AND PAYMENT

A. General: Metal lockers and benches will not be measured separately for payment but will be paid for as part of the Contract lump-sum price for Architectural Work.

1.03 SUBMITTALS

A. General: Refer to Section 01 33 23 – Shop Drawings, Product Data and Samples, for submittal requirements and procedures.

B. Shop Drawings and Product Data: Submit fully detailed Shop Drawings and manufacturer's product data of metal lockers, including layout of lockers, color chips, and installation details.

C. Samples: Submit locker manufacturer's standard color samples for selection. Submit 6 inches by 9-1/2 inches (full width) by 1-1/4 inch samples of finished bench top.

PART 2 – PRODUCTS

2.01 LOCKERS

A. Type and Manufacture: Lockers shall be Accessible Double Lockers of standard width, depth, and height as indicated. Lockers shall be furnished with sloping tops, raised bases, fillers as needed, panel ends, anchors, fasteners, and accessories as required for a complete and finished installation. Lockers shall be manufactured to meet or exceed the following requirements:

1. Locker Units: Size and configuration as indicated.

2. Bodies: Minimum 24 gage sheet steel, formed and flanged with stiffener ribs; electrically spot welded. Bolt spacing shall not exceed 9 inches on center.
   a. Do not install mounting fasteners through the bottom of the lower locker unless it is within 1-1/2 inches of the hinge side or the back of the locker.

3. Door Frame: Minimum 16 gage sheet steel, formed channel shape, welded and ground flush, welded to locker body.

4. Doors: Minimum 18 gage sheet steel, formed channel shape at vertical edges, flanged at top and bottom, with louvers at top and bottom of door face.

5. Locker Top, Closure Panels, and Trim: Provide end panels and filler panels to close off all openings. Provide continuous sloping top. Top, panels, and trim shall be minimum 20 gage sheet steel. Finish edges smooth without burrs.

B. Hardware:

1. Door Handle: Door handle and latching mechanism shall be the manufacturer's accessible lever handle with integral feature for locking the door with a padlock, manufactured from a chrome-plated non-corrosive alloy.

2. Hinges: Provide two hinges for doors under 42 inches in height and three hinges for doors over 42 inches in height. Weld hinges securely to locker frame and rivet securely to the door.

C. Number Plates: Polished aluminum or stainless steel with 1/2-inch high black figures. Numbering shall be provided, beginning with the number 100 and numbered consecutively thereafter.

D. Finish: Lockers, all exposed parts exterior and interior, panels, and enclosures, shall be bonderized or phosphatized to assure maximum paint adherence, primed with a corrosion inhibitive metal primer, and finished with manufacturer's baked enamel in color as selected by the Engineer from manufacturer's standards.

E. Benches: Perforated metal benches constructed from 13-gauge heavy duty steel using high strength steel framing as required to prevent sagging. Provide plastic top coating on the seating surface with high gloss finish to resist mildew and stains. Each bench to include (2) black powder coat galvanized steel pedestals with all components as required for complete, rigid installation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Lockers shall be installed as indicated and in accordance with the approved Shop Drawings and the manufacturer's installation instructions and recommendations. Install lockers in a rigid and substantial manner, straight and plumb, with all horizontal lines level.

B. Anchor lockers with appropriate anchor devices to suit materials encountered. Bolt adjoining locker units together to provide rigid installation. Install sloping top, end panels, and filler panels to completely close off openings.
   1. Bolts in bottom of locker shall be within 2 inches of the back or hinged side walls.

C. Adjust and lubricate hardware for proper operation after installation. Doors shall be free from hinge bind after installation.

D. Clean lockers and benches on completion of work and leave free from imperfections. Protect from damage until Contract acceptance.

E. Lockers shall be secured to the wall. Fastenings shall be designed by the Contractor to resist calculated loads of full lockers.

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SECTION 11 73 00
CEILING MOUNTED PATIENT LIFT SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.

B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

1.3 QUALITY ASSURANCE

A. Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by an independent third party who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Certificates of Compliance

C. Manufacturer's Literature and Data:

1. Lifting Capacity
2. Lifting Speed
3. Horizontal Displacement Speeds
4. Horizontal Axis Motor
5. Vertical Axis Motor
6. Emergency Brake
7. Emergency Lowering Device
8. Emergency Stopping Device
9. Electronic Soft-Start and Soft-Stop Motor Control
10. Current Limiter for Circuit Protection
11. Low Battery Disconnect System
12. Strap Length
13. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.

D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.

1.5 APPLICABLE PUBLICATIONS

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

B. International Organization for Standardization (IOS):
10535-06.....Hoist for the Transfer of Disabled Persons-Requirements and Test Methods

C. Underwriters Laboratories (UL):
60601-1.....Medical Electrical Equipment: General Requirements for Safety
94-2006.....UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):
801-2(1991).....Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment-Part 2: Electromagnetic Discharge Requirements

PART 2 - PRODUCTS

2.1 Design criteria

A. Ceiling lift model:
1. DC power system

B. Load capacity:
1. Maximum load capacity of 440 lbs.
2. Bariatric overhead lift system to have maximum load capacity of 880 lbs.

C. Traverse ability:
1. Motorized traverse with the ability to move along the track when operated by hand control.

D. Power supply:
1. Batteries: 2 rechargeable, valve regulated lead/acid, 12V, 2.6 Ah
2. UL approved battery charger. Battery charger to be splash proof and double insulated. No power cords are allowed in or in close proximity of the lift rails. Wall mounted 24V DC, max 1.5 A output, 40-60Hz. 100-240V AC, max 0.6 A Input, fully automatic shut down/restart. Battery charger method: Connecting the hand control to the battery charger charges Batteries. No open contact pads are allowed for battery charging.

3. Efficient battery charge cycle
4. Patient lift charging station to be supplied with 2ft tall parking panel to mount a 6" cord charger and sling bar hook. Charging station mounted directly above electrical outlet approximately 3ft above finished floor.

E. Lift case:
1. Fire retardant material.

F. Hand control:
1. The hand control is connected directly to the lift motor and is used for charging the batteries. An optional infared hand control is desirable.

G. Lift or traverse motor:
1. 24 V DC, 10A, Self-braking, motor-driven worm gear

H. Aluminum extruded rail:
1. Durable powder coat or epoxy painted finish.
2. Rail complete with necessary accessories and fixings.
3. Maximum deflection of any rail must meet ISO 10535 standards for lifting.

I. Emergency systems:
1. The lift must have two methods for emergency lowering, one electrical and one mechanical. The mechanical must function without any available electrical power and must be able to control and optional transfer motor.

J. Other requirements:
1. Automatic lift shut down after 10 minutes to conserve battery power.
2. Over-speed safety governor.
3. Soft start/stop for comfort
4. Heavy-duty battery supply for more lifts.
5. Visual/audible low battery indicator.

K. Safety:
1. Safety latches are required on each hook on the sling bar. The safety latches must be able to prevent the sling loops from coming loose from the hooks.
2. Ceiling attachments must have at least a four-fold safety margin at the highest static load capacity, which includes maximum lift capacity plus the weight of the lift system.
3. The maximum lifting height must be adjustable

L. Lifting requirements:
1. Padded carry bar for safety
2. Regular mesh sling.

M. Cross over switch:

1. An optional electric cross over switch must be available to connect a traverse lift system with a straight rail. One switch piece will be connected to the secondary traverse rail and the second switch part will be mounted on the straight rail. Both parts will be connected by an electrical control box, which is operated by a remote hand control. Safety logic must be built into the control box to prevent the switch from accidentally opening when there is not rail in the switching position. Mechanical protection must be in place to protect the operation of the switch in the case the rails are not lined up. The purpose is to prevent accidental movement of the lift out of the rail.

2.2 ELECTRICAL

A. In accordance with applicable portions of NEC (NFPA 70), NEMA ICS-1 and Electrical Section of Division 26.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.

B. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

C. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors to be built into masonry construction. Provide temporary bracing for such items until masonry is set.

D. Provide anchoring devices and fasteners as shown and as necessary for securing to building construction as specified.

3.2 INSTRUCTION AND PERSONNEL TRAINING

A. Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

A. Conduct performance test, in the presence of the Resident Engineer and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

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SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION

Manually operated sunscreen roller shades. Window shades shall be furnished complete, including brackets, fittings and hardware.

1.2 RELATED WORK

A. Color of shade cloth: refer to drawings

1.3 QUALITY CONTROL

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years of experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years of experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.

D. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

E. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified

requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

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

A167-99 (R2004)..... Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

B221-08..... Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

D635-06..... Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

D648-07..... Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

D1784-08..... Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

PART 2 - PRODUCTS

2.1 APPLICATIONS/SCOPE

A.Roller shade schedule:

1.Shade type 1: manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the drawings.

2.2 SHADECLOTH

A. Basis of Design

a. Visually Transparent Single-Fabric Shadecloth: Phifer, Inc., Shearweave 5000 series, single thickness non-raveling 0.038-inch (0.762 mm) thick vinyl fabric, woven from 0.018-inch (0.457 mm) diameter extruded vinyl yarn comprising of 27 percent polyester and 73 percent reinforced vinyl, in colors shown in drawings.

1. Style: "5000 series", 10 percent open, Jacquard pattern.

B. Performance

1. The shadecloth shall be tensioned in the finishing range prior to heat setting to keep the warp ends straight, minimize or eliminate weave distortion, and keep the shadecloth flat. The fabric shall be finished with heat and pressure and be dimensionally stable.

2. As a shadecloth, the material shall hang flat without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. The unguided shade band shall roll true and straight, without shifting sideways more than ± 1/8 in. in either direction due to warp distortion or weave design.

C. Flame Retardance

1. Shadecloth shall be certified by an independent laboratory to pass the Large or Small Scale Vertical Burn Requirements of the National Fire Protection Association (NFPA).

D. Solar Optical Properties

1. Shadecloth shall be offered as standard products. Each pattern and series shall be readily available in at least three varying degrees of density and openness to accommodate the various solar loads on each of the different exposures of a building. The shadecloth shall be woven of the same yarns, have similar weaves, and be color matched by dye lot.

2.3 SHADE BAND

A. Shade bands: construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem pockets and hem weights: fabric hem pocket with rf-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2.4 SHADE BAND AND SHADE ROLLER ATTACHMENT:

A. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.

B. Provide for positive mechanical engagement with drive / brake mechanism.

c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.

D. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.

E. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:

1. Bottom hem weights.
2. Concealed hemtube.

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (w:h) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

E. Provide battens for railroaded shades when width-to-height (w:h) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.6 COMPONENTS

A. ACCESS AND MATERIAL REQUIREMENTS:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use only delrin engineered plastics by dupont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. **DRIVE BRACKET / BRAKE ASSEMBLY:**

1. Drive bracket shall be fully integrated with all accessories, including, but not limited to: snaploc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
2. Drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
3. The brake shall be an over -unning clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
4. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
5. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
6. DRIVE CHAIN: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted fastenings.

2.7 ACCESSORIES

A. Roller Shade Pocket for recessed mounting in acoustical tile, or drywall ceilings as indicated on the Drawings (for Shade Type 1).

1. Provide either extruded aluminum, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Resident Engineer of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Window Shades: Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

1. Locate rollers in level position as high as practicable at heads of windows to prevent infiltration of light over rollers.

2. Where extension brackets are necessary, on mullions or elsewhere, for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
3. Place brackets and rollers so that shades will not interfere with window hardware.
4. Mount shades at wire mesh window guards on head rails of hinged frame.
5. Shade installation methods not specifically described, are subject to approval of Resident Engineer.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

E. Engage Installer to train VA's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

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SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies wood veneer and/or plastic laminate casework as detailed on the drawings, including related components and accessories required to form integral units. Wood casework items shown on the drawings, but not specified below shall be included as part of the work under this section, and applicable portions of the specification shall apply to these items. Each like item of casework shall be of the same design and by one manufacturer.

1.2 RELATED WORK

A. Custom Casework: Section 06 20 00, FINISH CARPENTRY.

B. Color and Finish of Plastic Laminate: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Lavatories and Plumbing in Casework: Section 22 40 00, PLUMBING FIXTURES.

1.3 MANUFACTURER'S QUALIFICATIONS

The fabrication of casework shall be by a manufacturer who produces casework similar to the casework specified and shown.

1.4 SUBMITTALS

A. Submit in accordance with Section `01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:
Sinks, trim and fittings.
Locks for doors and drawers
Adhesive cements

C. Samples:
Counter top, plastic laminate, 150 mm (six inch) square
Wood Face Veneer or Hardwood Plywood

D. Shop Drawings (1/2 full size):

1. All casework, showing details of construction, including materials, hardware and accessories.
2. Cabinets and counters showing faucets in connection with sink bowls, and electrical fixtures and receptacles which are mounted on cabinets and counters.
3. Fastenings and method of installation.

E. Mock-Up: Where required for special casework and where four or more similar units are involved, submit a mock-up of a typical unit for approval by resident engineer.

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 basic designation only.

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

A167-99 (R2004).....Stainless and Heat-Resisting chromium-Nickel Steel Plate, Sheet and Strip

A1008/A1008M - 08a.....Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

C1036-06.....Flat Glass

C. Composite Panel Association (CPA):

A208.1-99.....Particleboard

D. U.S. Department of Commerce Product Standards (Prod. Std):

PS1-07.....Structural Plywood

E. Hardwood, Plywood and Veneer Association (HPVA):

HP.1-04.....Hardwood and Decorative Plywood

F. Architectural Woodwork Institute (AWI):

Architectural Woodwork Quality Standards, Guide Specifications Quality Certification Program - 1999

G. American Society of Mechanical Engineers (ASME):

A112.18.1-05.....Plumbing Fixture Fittings

H. National Electrical Manufacturers Association (NEMA):

LD3-05.....High Pressure Decorative Laminates

I. Hardwood Plywood and Veneer Association

HP-1.....Hardwood and Decorative Plywood

PART 2 - PRODUCTS

2.1 PLYWOOD, HARDWOOD FACE VENEER

HPVA HP-1, Premium Grade . Veneer to match existing.

2.2 PLASTIC LAMINATE:

A. NEMA LD-3.

B. Exposed decorative surfaces including countertops, 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, LD3 as a minimum.

1. Plastic laminate clad plywood or particle board.
2. Resin impregnated decorative paper thermally fused to particle board.

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 PLYWOOD, SOFTWOOD

Prod. Std. PS1, five ply construction from 13 mm to 28 mm (1/2 inch to 1-1/8 inch) thickness, and seven ply for 31 mm (1 1/4 inch) thickness.

2.4 PARTICLEBOARD

CPA A208.1, Type 1, Grade 1-M-3.

2.5 RUBBER OR VINYL BASE

Straight (for carpet), cove (for resilient floor); 100 mm (4 inch) high, 3 mm (1/8 inch) thick, flexible to conform to irregularities in walls, partitions and floors.

2.6 PLUMBING FIXTURES

ASME A112.18.1, except die-cast zinc-alloy material is not acceptable.

2.7 GLASS: ASTM C1036

For Doors: Type I, Class 1, Quality q4.

2.8 SOLID WOOD

Wood required for edge banding, moldings , legs shall be of same species as wood face veneer.

2.9 SHEET STEEL

ASTM A1008.

2.10 STAINLESS STEEL

ASTM A167, with No. 4 finish.

2.11 HARDWARE

A. Where pin tumbler locks are specified, disc tumbler lock "Duo A", with brass working parts and case, as manufactured by the Illinois Lock Company will be an acceptable substitute. Locks for each type casework, shall be keyed differently and shall be master-keyed for each type service, such as Nurses, Psychiatric, and Administration. Provide two keys for each lock. Exposed hardware, except as otherwise specified, shall be satin finished chromium plated brass or nickel plated brass.

B. Marking of Locks and Keys:

1. The name of the manufacturer, or trademark by which manufacturer can readily be identified, legibly marked on each lock.
2. The key change number marked on the exposed face of lock, and also stamped on each key.
3. Key change numbers shall provide sufficient information for replacement of the key by the manufacturer.

C. Hinged Doors:

1. Doors 900 mm (36 inches) and more in height shall have three hinges and doors less than 900 mm (36 inches) in height shall have two hinges. Each door shall close against two rubber bumpers.
2. Hinges: Fabricate hinges with minimum 2 mm (0.072 inch) thick chromium plated steel leaves, and with minimum 3.5 mm (0.139 inch) diameter stainless steel pin. Hinges shall be five knuckle design with 63 mm (2-1/2 inch) high leaves and hospital type tips.
3. Fasteners: Provide full thread wood screws to fasten hinge leaves to door and cabinet frame. Finish screws to match finish of hinges.

D. Door Catches:
1. Friction or Magnetic type, fabricated with metal housing.
2. Provide one catch for cabinet doors 1200 mm (48 inches) high and under, and two for doors over 1200 mm (48 inches) high.

E. Locks:
1. Cylinder type pin tumbler.
2. Equip doors and drawers where shown with locks.

F. Drawer and Door Pulls:
Doors and drawers shall have flush pulls, fabricated of either chromium plated brass, chromium plated steel, stainless steel, or anodized aluminum.

G. Drawer Slides:
1. Full extension steel slides with nylon ball-bearing rollers.
2. Slides shall have positive stop.
3. Equip drawers with rubber bumpers.

H. Sliding Doors:
1. Each door shall be supported by two ball bearing bronze or nylon rollers, or sheaves riding on a stainless steel track at top or bottom, and shall be restrained by a nylon or stainless steel guide at the opposite end.
2. Plastic guides are not acceptable.
3. Each door shall have rubber silencers set near top and bottom of each jamb.

I. Shelf Standards (Except For Fixed Shelves):
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.

J. Gate Bolt:
Surface mounted barrel type with strike.

K. Hinged Gates:

Gates shall have two double-acting hinges or pivots as recommended by manufacturer, size as required.

2.12 FABRICATION

A. Casework shall be of the design to match existing and, except as otherwise specified, be of premium grade construction and of component thickness in conformance with AWI Quality Standards.

B. Fabricate casework of plastic laminated covered plywood or particleboard, or factory finished wood veneer to match existing, as follows:

1. Where shown, gates , doors , drawers , shelves , all semi-concealed surfaces shall be plastic laminated.
2. Horizontal and vertical reveals between doors and drawer for reveal overlay design shall be 19 mm (3/4 inch) unless otherwise shown.
3. Glazed doors shall have 5 mm (3/16 inch) thick glass, set in glazing compound.
4. Sliding doors shall have stops to prohibit bypass and be removable without use of tools.

C. Electrical fixtures, receptacles, wiring and junction boxes required for fixtures and receptacles:

1. Factory installed in casework.
2. For electrical lighting fixtures, see drawings.
3. For electric receptacles and lighting fixtures installed below or adjacent to wall cabinets or above counter tops, see electrical sections or specifications.
4. Install wiring in built-in raceways and terminate at junction box mounted on rear of cabinet and counter.
5. For final hook-up at junction box see electrical sections of specifications.

D. Provide 18 gage sheet steel sloping tops for casework where shown. Fasten sloping tops with oval-head screws inserted from interior. Exposed ends of sloping tops shall have flush closures fastened as recommended by manufacturer.

E. Base:

1. Provide rubber or vinyl base with close, flush joints; set with adhesive.
2. Remove adhesive from exposed surfaces.
3. Install base at floor line after casework has been accurately leveled.
4. Rub base to glossy finish.

F. Countertops:

1. Countertops, splashbacks and reagent type shelves shall be plastic laminate factory glued to either a plywood (PS1), or particleboard (CPA A208.1) core.
2. Countertops shall be 19 mm (3/4 inch) thick.
3. Splashbacks and reagent type shelves shall be finished 19 mm (3/4 inch) thick and be secured to countertops with concealed metal fastenings and with contact surfaces set in waterproof adhesive.
4. Provide cut-outs for plumbing trim where shown.
5. Cover exposed edges of countertops, splashbacks and reagent type shelves // with plastic.

G. Sink bowls:
1. 18 gage stainless steel, of size and design shown.
2. All interior corners of bowls shall be formed to manufacturer's standard radii.
3. Sinks shall have rims with flanged edges overlapping tops to provide tight joints.
4. Secure sink bowls with concealed fastenings.
5. For service lines from service fixtures, see other sections of specifications.

H. Provide the following plumbing trim and fittings:
1. Faucets: ASME A112.18.1 Type I, compression type, countertop mounted, chromium plated brass, having two valves and with swing-spout and gooseneck spout as shown, elevated to clear handles.
2. Fittings shall have an elongated escutcheon for spout and handles, replaceable valve seats and four arm or lever style indexed chromium plated brass or stainless steel handles; handles either with or without hood.

I. Faucets:
1. ASME A112.18.1 Type I, compression type, splashback mounted, chromium plated brass, having two valves and with swing-spout and gooseneck spout as indicated.
2. Fittings shall have exposed body union inlets and adjustable flanges.
3. Valves shall have indexed chromium plated brass or stainless steel lever handles and replaceable valves seats; handles either with or without hood.

J. Drain:
1. Cast or wrought brass or stainless steel with flat strainer.
2. Surfaces of drains exposed from above shall have a chromium plated finish.

K. Traps: Cast brass.

L. Spray Hose:
   1. Hose shall drop below counter top when not in use and be of sufficient length to reach the entire length of the countertop.
   2. Concealed trim may be rough brass.
M. Support Members for Tops of Tables:
   1. Construct as detailed.
   2. Provide miscellaneous steel members and anchor as shown.
N. Legs For Counters:
   1. Fabricate legs for counters of 1.6 mm (0.0635 inch) thick, 38 mm (1-1/2 inch) square tubular stainless or steel where shown.
   2. Secure legs to counter tops and provide legs at bottom with shoes not less than 25 mm (one inch) in height.
   3. Fabricate shoes of either stainless steel, aluminum or chromium plated brass.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set casework in place; level, plumb and accurately scribe and secure to walls, and/or floors.
B. The installation shall be complete including all trim and hardware. Leave the casework clean and free from defects.

3.2 FASTENINGS

A. Fastenings for securing casework to adjoining construction shall be as detailed on the drawings or approved shop drawings.
B. See Section 05 50 00, METAL FABRICATIONS for reinforcement of walls and partitions for casework anchorage.

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SECTION 12 36 00
COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies plastic laminate casework countertops as shown on drawings.

1.2 RELATED WORK

A. Color and patterns of plastic laminate: refer to drawings.

B. DIVISION 22, PLUMBING.

C. DIVISION 26, ELECTRICAL.

D. Equipment Reference Manual for SECTION 12 36 00, COUNTERTOPS.

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 1/2 scale.

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. Composite Panel Association (CPA):

A208.1-99.....Particleboard
A135.4-04.....Basic Hardboard

C. American Society of Mechanical Engineers (ASME):

A112.18.1-05.....Plumbing Fixture Fittings
A112.1.2-04.....Air Gaps in Plumbing System

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

A167-99 (2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
A1008-08a.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength, Low Alloy
D256-06ae1.....Pendulum Impact Resistance of Plastic
D570-98(2005).....Water Absorption of Plastics
D638-08.....Tensile Properties of Plastics

D785-08.....Rockwell Hardness of Plastics and Electrical Insulating Materials

D790-07e1.....Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D4690-99 (2005).....Urea-Formaldehyde Resin Adhesives

G21-96 (2002).....Determining Resistance of Synthetic Polymeric Materials to Fungi

E. Federal Specifications (FS):

A-A-1936.....Adhesive, Contact, Neoprene Rubber

F. U.S. Department of Commerce, Product Standards (PS):

PS 1-07.....Structural Plywood

G. 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.

B. Sheet Steel: ASTM A1008, cold rolled, Class 1 finish, stretcher leveled.

C. Particleboard: CPA A208.1, Grade 2-M-2.

D. Plywood: PS 1, Exterior type, veneer grade AC not less than five ply construction.

E. 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.

F. 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.
   3. Cast into sheet form and bowl form.
   4. Color throughout with subtle veining through thickness.

5. Dupont "Corian" is acceptable if meeting the above properties.
6. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.

2.2 SINKS

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.

2.3 TRAPS AND FITTINGS

A. Material as specified in DIVISION 22, PLUMBING.
B. 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.

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. 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.

2.10 COUNTERTOPS

A. Fabricate in largest sections practicable.
B. Fabricate with joints flush on top surface.
C. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets.
D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
E. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
F. Fabricate with end splashes where against walls or cabinets.
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.

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.

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.

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SECTION 13 49 00
RADIATION PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies lead radiation shielding.

B. Construction of products and assemblies used for radiation shielding complying with applicable requirements of NCRP Reports 35, 49 and 102.

C. This section includes the following items:

1. Lead Lined Wood Doors
2. Lead Lined Shields
3. Lead Glass
4. Lead Lined Frames
5. Thresholds
6. Cassette Transfer Cabinets
7. Lead Louvers
8. Lead Lined Concrete Masonry Units
9. Lead Sheet
10. Lead Lined Plywood
11. Lead Lined Gypsum Lath
12. Lead Lined Gypsum Wallboard

1.2 RELATED WORK

A. Structural steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.

B. Cold Formed Metal Framing: Section 05 40 00, COLD FORMED METAL FRAMING.

C. Wood Veneer finish for doors: Section 08 14 00, WOOD DOORS, and Section 09 06 00, SCHEDULE FOR FINISHES.

D. Steel door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

E. Hardware for doors: Section 08 71 00, DOOR HARDWARE.

F. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES ; Section 08 14 00, WOOD DOORS ; Section 08 71 00, DOOR HARDWARE.

1.3 MANUFACTURERS QUALIFICATIONS

A. Approval by Contracting Officer is required of product or service of proposed manufacturer and suppliers, and will be based upon submission by Contractor of certification that:

1. Manufacturer regularly and presently manufactures lead radiation shielding as specified as one of its principal products.
2. Manufacturer's product submitted has been in satisfactory and efficient operation or three installations similar and equivalent to this project for three years.
3. Manufacturer submits list of installations.

1.4 TESTS

A. Lead radiation shielding will be tested at the expense of the Government after X-ray equipment is installed.

B. Any additional testing required due to correction and replacement of defective work will be done by the Government at Contractor's expense. **NOTE:** Lead glass, lead lined concrete masonry units, lead lined gypsum lath, lead lined gypsum wallboard and lead lined plywood will not be tested prior to installation.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Each lead radiation shielding item specified showing thickness of lead, details of construction and installation.

C. Samples:

1. Lead lined concrete masonry units, gypsum lath and gypsum wallboard.
2. Bottom corner section of lead lined door, 300 mm (12 inches) square showing bottom and side edge strips.

D. Manufacturers' Literature and Data: Each lead radiation shielding item specified.

1.6 WARRANTY

A. Warranty lead lined doors against defects in workmanship and materials subject to terms of "Warranty of Construction" Article in Section 00 72 00, GENERAL CONDITIONS, except that warranty period shall be two years.

B. Warp or twist of lead lined flush veneered doors may not exceed 6 mm (1/4 inch) in any face dimension of door (including full diagonal), measured not less than six months after doors have been hung and finished.

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. Federal Specifications (Fed. Spec.):

QQ-L-201F(2).....Lead Sheet

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

A167-99(R2004).....Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

C36-03(E2004).....Gypsum Wallboard

C37-01.....Gypsum Lath

C90-08.....Load-Bearing Concrete Masonry Units

C1002-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases

D1187-97(R2002)e1.....Asphalt-Base Emulsions for Use as Protective Coatings for Metal

D. United States Department of Commerce Product Standard (PS):

FED PSI 83-84.....Construction and Industrial Plywood

E. Military Specifications (Mil. Spec.):

MIL-C-36373.....Cabinet, Cassette Transfer, Wall Mounted

F. National Council on Radiation Protection and Measurements (NCRP):

Report 145.....Radiation Protection in Dentistry (2003)

Report 151.....Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities (2005)

Report 102.....Medical X-Ray, Electron Beam and Gamma-Ray protection for Energies up to 50 MeV (Equipment Design, Performance and Use), (1989)

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lead Sheet: Fed. Spec. QQ-L-201, Grade C, of thickness shown on drawings.

B. Lead Lined Concrete Masonry Units:

1. ASTM C90.
2. Units shall have unpierced sheet lead through vertical centers arranged to provide effective lead insulation through all joints.
3. Secure sheet lead to masonry units either by latex bonding (vulcanizing) method, or by galvanized iron anchors soldered or cemented to lead.

C. Lead Lined Gypsum Lath:

1. ASTM C37, 9 mm (3/8 inch) thick.
2. Bond sheet lead to one side of lath using plastic adhesive which will not dry out, nor set up hard, nor allow sheet lead to pull loose.
3. Apply sheet lead in uniform thickness shown, unpierced and in one piece.
4. Extend lead one inch beyond edge of each piece of lath at top and at one end.

D. Lead Lined Gypsum Wallboard:

1. ASTM C36, Type X, 16 mm (5/8 inch) thick.
2. Factory bond sheet lead to one side of wallboard.
3. Apply sheet lead in thicknesses shown, unpierced and in one piece.

E. Lead Lined Plywood Panels:
   1. Prod. Std. PS1, Grade A-A interior type, 9 mm (3/8 inch) thick.
   2. Factory bond sheet lead to one side of plywood.
   3. Apply sheet lead in thicknesses shown, unpierced and in one piece.
   4. Make each panel in one piece and of width to fully sustain its own weight without requiring intermediate nailing between joints.
F. Stainless Steel: ASTM A167.
G. Lead Glass: Clear, X-ray proof, of sufficient thickness to provide X-ray protection equivalent to that provided by partition or door in which glass occurs.
H. Lead Control Windows: Cast lead, rigid, single unit type without joints, with or without voice passage as shown and with lead stop beads and lead glass.
I. Cassette Transfer Cabinets, MIL-C-36373: Sheet lead lining of cabinets shall provide X-ray protection equal to that provided by partition in which cabinets occur.
J. Thresholds:
   1. Lead lined stainless steel as detailed.
K. Fasteners:
   1. Cadmium or chromium plated steel screws for securing lead louvers.
   2. Standard steel drill screws, ASTM C1002, with lead washers for application of lead lined sheet materials to metal studs and attach washers in accordance with shielding manufacturer's instructions.
   3. Nails:
      a. Use barbed lead head nails for application of lead lined materials to wood furring strips.
      b. Long enough to penetrate furring strips not less than 25 mm (one inch).
      c. Cast-lead head sufficiently thick to equal lead shielding of room provided.
L. Lead Discs: Same thickness as lead lining, diameter 25 mm (1 inch) larger than fastener.

2.2 FABRICATION

A. General: Lead lining of frames, doors and other items occurring in partitions shall provide an X-ray absorption equivalent to that of partitions in which they occur.
B. Clearance between Doors and Frames and Floors:
   1. Jambs and Heads: A maximum 3 mm (1/8 inch) clearance.
   2. Bottom of door to finish floor: Maximum 19 mm (3/4 inch) clearance.

C. Lead Lined Wood Doors:

1. Flush veneered construction.
2. Construct doors of two separate solid wood cores with a single sheet of lead lining through center.
3. Doors shall have filler strips, crossbanding, face veneers and hardwood edge strips, all glued together with unextended urea resin glue applied under heavy pressure.
4. Extend sheet lead lining to all door edges, providing X-ray absorption equal to partition in which door occurs.
5. Fasten wood cores together with either countersunk steel bolts through lead with bolt heads and nuts covered with poured lead, or with poured lead dowels.
6. Bolts or dowels shall be located 38 mm (1-1/2 inches) from door edges, and at not more than 200 mm (eight inches) on center in each direction over door area.
7. Finish face of dowels and lead covering of bolt heads and nuts flush with wood cores.
8. Edge strips:
   a. Same species of wood as face veneer.
   b. Minimum thickness of edge strips shall be 38 mm (1-1/2 inches) at top edge and 63 mm (2-1/2 inches) at bottom edge.
   c. Glue strips to cores before face veneer is applied.
   d. Extend vertical edge strips full height of door and bevel 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness.
   e. Give top and bottom edges of doors to receive transparent finish two coats of water resistant sealer before shipment to site.
   f. For door to Deep Therapy, provide lead strip on all four edges of door.
9. Crossbanding of hardwood:
   a. Not less than 2 mm (1/12 inch) thick and face veneer not less than 1 mm (1/28 inch) thick, after sanding.
   b. When straight grain stock such as Basswood, Aspen or Poplar is used for crossbanding, its thickness may be 1.6 mm (1/16 inch) in lieu of 2 mm (1/12 inch).
10. Face veneer for doors specified in Section 09 06 00, SCHEDULE FOR FINISHES to have transparent finish, shall be rotary cut premium grade, uniform light, Birch.
11. Face veneer for painted doors shall be rotary cut, good grade, mill choice close grained hardwood, except lauan is not acceptable. Use only one species of wood for face veneer.

a. Use identical face veneer on both sides of door. Apply face veneer with grain vertical.
b. Give doors to be painted a shop prime coat of exterior oil paint on all surfaces before shipment to site.

12. Secure glass panels with hardwood stops of same species as face veneer. Glue stops to doors on corridor side and fasten with countersunk ovalhead screws on room side. Finish edge of stop flush with face veneer.

D. Hardware:

1. Hardware for doors is specified in Section 08 71 00, DOOR HARDWARE.
2. Stagger bolts to door pulls on plates which penetrate lead lining relative to opposite plate and recess on side of door opposite pull.
3. Provide lead plugs or discs over recessed nut ends of such bolts, unless otherwise shown.
4. Nut ends of bolts for surface applied hinges , door closures , and automatic door operators shall be countersunk and covered with lead lined 16 gage stainless steel pans.
5. Provide round head screws with dull chromium plated finish to secure stainless steel pans.
6. Provide mortises for flushbolts, floor hinge arms, and top pivots with sheet lead on each side. Enclose floor boxes of floor hinges with sheet lead at sides and bottom.
7. Make recesses for lock and latch cases at mill and line with lead butted tightly to lead in door.
8. Make total thickness of sheet lead used for lining hardware, equivalent to thickness of sheet lead core of door.
9. Protection and installation of doors and hardware is specified in Section, 08 11 13 , 08 14 00 , 08 71 00, HOLLOW METAL DOORS AND FRAMES / WOOD DOORS / DOOR HARDWARE.

E. Lead Lining of Frames:

1. Line or cover steel frames, stops for doors, and corner type control windows with sheet lead.
2. Install sheet lead free of waves, lumps and wrinkles with as few joints as possible.
3. Make joints in sheet lead to obtain X-ray absorption equivalent to adjacent sheet lead. Finish joints smooth and neat.
4. Structural steel frames and metal door frames for lead lined doors are specified in Section 05 50 00, METAL FABRICATIONS and Section 08 11 13, HOLLOW METAL DOORS AND FRAMES respectively.

F. Thresholds:

1. Neatly fit thresholds around cover plates of floor hinges. Lead lining shall enclose box of floor hinge.
2. Provide stainless steel expansion bolt fasteners as detailed.

G. Lead Rayproof Louvers:
1. Fabricate louvers entirely of lead of thickness required to provide protection equivalent to that required in adjoining construction, and fastened with exposed screws.
2. Fastenings for louvers in doors must not penetrate lead lining of door.

PART 3 - EXECUTION

3.1 LEAD LINED MASONRY UNIT PARTITIONS

A. Lay lead lined concrete masonry units in courses with staggered vertical joints and lay to provide log cabin bond of at least 100 mm (four inches) at corners and angles.
1. Concrete masonry units designed to have lead laps at joints: Erect in a manner to provide minimum 25 mm (one inch), tight lead laps without soldering or burning.
2. Concrete masonry units designed to have lead bars in joints: Erect in a manner to permit lead bars (horizontal and vertical), of thickness not less than that in concrete masonry units, to be inserted in each joint.
3. Masonry units containing 6.0 mm (1/4-inch) lead or less in thickness: Constructed to provide a 38 mm (1-1/2 inch) lead lap between units by overlapping of lead in adjoining masonry units when erected.
4. Masonry units containing more than 6.0 mm (1/4-inch) lead thickness:
   a. Construct to receive lead bars in all joints when erected.
   b. Bars shall lap lead in adjoining masonry units not less than 19 mm (3/4 inch).
5. Provide special shapes to maintain proper bond. Cut units in the field in a manner not to effect the bond, lapping margin, or the shielding qualities of the lead.

B. Mortar joints:
1. 13 mm (1/2 inch) thick and filled solid with mortar as specified under Section 04 20 00, UNIT MASONRY.
2. Mortar between lead laps will not be permitted.

C. Extend partitions into frame openings, with lead projecting into rabbets of frames to effectively lap with lead frames or frame lining. Fill voids around frames with mortar.

D. Where pipe and conduit chases occur within the partitions, concrete may be removed from one side of the partition as required to permit pipe installation.
   1. Where it is necessary to remove lead lining for pipe or conduit installations, install continuous sheet lead and fasten in a manner to overlap the adjoining construction.
   2. Fill voids around pipe and conduit chases within the partitions with mortar and finish flush with the face of the partition. Pipe and conduit chases shall not be installed directly opposite each other within the same partitions.

3.2 FLOOR LEAD

A. Concrete floor slabs:
   1. Thoroughly cleaned and smooth, and free of defects that might cause damage to lead.
   2. Floor slab shall be cured a minimum of 90 days.
   3. Before installation of lead, coat concrete surfaces with two coats of asphalt-base emulsion (ASTM D1187).
   4. Lap sheets of floor lead not less than 38 mm (1-1/2 inches).
B. After installation of sheet lead, apply two coats of Asphalt base emulsion material over the lead and protect from damage until concrete fill and floor topping in installed.
C. Lead lined concrete masonry partitions:
   1. Place a continuous lead strip under partitions with a 50 mm (two inch) projection on X-ray room side, in new construction..
   2. Overlap sheet lead on floors on lead strips at least 38 mm (1-1/2 inches), in existing construction.
D. Lead lined lath or panels: Sheet lead on floors shall lap lead lining in wall a minimum of 38 mm (1-1/2 inches).
E. Where lead lined thresholds are not required, continue lead strips under partitions across door opening and extend strip 300 mm (12 inches) outside of partition and 300 mm (12 inches) beyond each jamb of door openings.
F. For existing floors:
   1. Lay lead sheets with butt joints.
   2. Lay lead strip 38 mm (1-1/2 inches) wide and of same thickness as floor lead centered under full length of each butt joint.
   3. Lay strips in concrete fill as shown, to same clearances provided in existing floor so that top of strip will be level with existing floor.

3.3 LEAD LINED PLYWOOD PANELS

A. Vertically apply panels over metal studs as shown. Predrill or drill pilot holes for nails or screws as necessary to prevent deformation of the nail, lead shielding and to prevent distortion of the panel.

B. Lead lined panels: Butt jointed with all joints placed over supports and with lead linings placed next to supports.

C. Lead laps at corners and around frames of openings: Made with panels having lead extensions or with sheet lead strips not less than the thickness of the lead in the panel.

D. Nails:

1. Set 2 mm (1/16 inch) below face of the panel or joint strip in which they occur and finished with filler or plugs.
2. Nailings at intermediate supports will not be permitted.

E. Nailing at joints shall conform to one of the following methods:

1. Joints with lead lined joint strips:
   a. Nail sides and ends of panels at approximately 200 mm (eight inches) on centers with wire nails of sufficient length to penetrate 38 mm (1-1/2 inches) into supports and to penetrate furring members.
   b. Cover joints with a 50 mm (two inch) wide lead lined joint strip of the same material as the panels and secured to supports with lead headed nails.
   c. Nail joint strips at approximately 200 mm (eight inches) on centers with the nails located in center of joint strips.
   d. Quarter round strips: Install adjacent to joint strips and secured by nailing with wire nails to joint strips without penetrating the lead.
2. Joints backed with lead strips:
   a. Sheet lead strips not less than the thickness used for the panels and not less than 38 mm (1-1/2 inches) wide shall be installed on supports where panel joints occur.
   b. Secure the lead strips to supports by nailing with wire nails at outer edges of strips.
   c. Nail sides and ends of panels at approximately 200 mm (eight inches) on centers with lead headed nails.
   d. Install molding strips to cover joints and secure with nails at approximately 200 mm (eight inches) on centers.

3.4 LEAD LINED GYPSUM LATH

A. Apply lath to wood furring strips or metal studs as shown.

B. Predrill or drill pilot holes for nails , screws as necessary to prevent deformation of the nail and lead shielding and to prevent distortion of the lath.

C. Apply lead lined lath with long edges at right angles to supports and with lead linings placed next to supports.
   1. Place end joints over supports, and stagger in alternate courses.
   2. Wall joints shall not coincide with ceiling joints.
   3. Each sheet shall overlap the lead extension on the adjacent sheet, providing an effective lead lap.
   4. Lath shall be close fitted and uniformly secured to supports.

D. Extend lath into frames of openings effectively lapping with lead frames or frame linings. Unless otherwise approved, arrange lath around openings so that neither horizontal nor vertical joints occur at corners of openings.

E. Reinforce external corners with corner beads. Internal corners except at unrestrained suspended ceilings shall be reinforced as required by manufacturer and installed with nails or tie wire and lead clips or screws and washers.

F. Uniformly nail lath to wood supports with heads flush with lath surface or secure to studs with screws and lead washers at approximately 175 mm (seven inches) on centers.

G. At unrestrained ceilings, install square-nosed casing beads at junction of wall and suspended ceilings.

H. When ceramic tile wall finish on metal lath and mortar setting bed is to be installed over lead lined gypsum lath, wrap an 18 gage stainless steel tie wire about center of every second nail or screw when half-driven. Both ends of each tie wire shall be of sufficient length so that when nail or screw is fully driven, fastening of metal lath may be accomplished.

3.5 LEAD LINED GYPSUM WALLBOARD PANELS

A. Apply lead lined gypsum wallboard to wood furring strips and metal studs as shown.

B. Predrill or drill pilot holes for nails or screws as necessary to prevent deformation of the fastener and lead shielding and to prevent distortion of the wallboard.

C. Apply wallboard vertically with lead linings placed next to supports.

D. Install sheet lead strips behind joints not less than the thickness used for the wallboard.

1. The lead strips: 45 mm (1-3/4 inches) wide, except at corner joints, 45 mm by 45 mm (1-3/4 by 1-3/4 inch) lead angles shall be used.
2. Secure the lead strips to supports at outer edges of strips.

E. Wallboard:
1. Nail to supports with nails fastened to supports with screws and lead washers or discs at approximately 250 mm (ten inches) on centers.
2. Make provisions for connection with lead lined door frames and for cutouts for vision panels.
3. Joint treatment of lead lined gypsum board panels and fastening depressions shall be as specified for wallboard in Section 09 29 00, GYPSUM BOARD.

3.6 SUPPLEMENTAL LEAD SHIELDING

A. Line or cover penetrations of wall lead, pipe chases, columns fasteners and elsewhere where shown with sheet lead. Install sheet lead free of waves, lumps and wrinkles and with as few joints as possible. Joints in sheet lead shall provide X-ray absorption equivalent to adjacent sheet lead finished smooth and neat.

B. Where plaster finish is required over columns or other vertical surfaces covered with sheet lead, drive bolts or other fasteners securing the sheet lead to backing surface half way, and wrap an 18 gage stainless steel tie wire around fasteners. Both ends of each tie wire shall be of sufficient length so that when fastener is fully driven, fastening of metal lath may be accomplished. Locate fasteners not over 400 mm (16 inches) on centers both ways and cover heads with lead strips or discs if washers are not used.

C. Provide sufficient lead shielding for spaces around outlet boxes, junction boxes, film illuminators, and pipes, to obtain a net radiation protection at these spaces equaling net radiation protection specified for wall or partition in which they occur.

3.7 SIGNS: FURNISH SIGNS AS FOLLOWS:

A. One for each Dental X-Ray Room , X-Ray , and Examination Rooms, lettered as follows:
THE PARTITIONS, THE DOOR, AND THE SHIELD OF THIS ROOM HAVE BEEN INSULATED WITH SHEET LEAD OF _____ mm THICKNESS PROVIDING A TOTAL LEAD EQUIVALENT PROTECTION OF ___ mm.

B. One for each Radiographic Room, Radiographic and Fluoroscopic Room , Special Procedures Room and for each Fluoroscopic Room , Cystoscopic Room Insulated with sheet lead and lettered as follows:

SURFACES OF THIS ROOM HAVE BEEN INSULATED WITH SHEET LEAD OF THE FOLLOWING THICKNESS TO A HEIGHT OF 2100 mm (7 FEET) ABOVE FLOOR SLAB: PROVIDING A TOTAL LEAD EQUIVALENT PROTECTION OF:

DOORS AND FRAMES: _____ mm

PARTITIONS: _____ mm

FLOORS: _____ mm

C. One for each lead insulated partition in room in which not all partitions are insulated (or in which partitions on dark room side have been insulated differently from other partitions of room), located on partition and lettered as follows:

THIS PARTITION HAS BEEN INSULATED FULL HEIGHT TO HEIGHT OF _____ FEET, WITH SHEET LEAD OF _____ mm THICKNESS, PROVIDING A TOTAL LEAD EQUIVALENT PROTECTION OF _____ mm.

D. One for door to which only the door is insulated, lettered as follows:

THIS DOOR HAS BEEN INSULATED WITH SHEET LEAD OF _____ mm THICKNESS, PROVIDING A TOTAL LEAD EQUIVALENT PROTECTION OF _____ mm.

E. Signs:

1. Heavy white paper or cardboard.
2. Height of lettering and number not less than 3 mm (1/8 inch).
3. Fill in blank spaces on signs with mm thickness of lead as installed and total mm thickness of lead equivalent (determined by VA Physicist) and height of such insulation where required.
4. Mount in stainless steel or extruded aluminum frames (with acrylic plastic, 3 mm (1/8 inch) thick over sign) and fasten with suitable screws, one to each corner of each frame.
5. Provide manufacturer's standard stainless steel frame, to hold card size 100 mm by 150 mm (four by six inches).

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