DEPARTMENT OF VETERANS AFFAIRS
SPECIFICATIONS – Vol. 1 – Divisions 1 - 14

For Expand Clinics for PACT at the DVA Medical Center, Iowa City, Iowa
PROJECT NO.: 636-201 / HEERY PROJECT NO.: 1125503

For

VETERANS AFFAIRS MEDICAL CENTER
at
IOWA CITY, IOWA

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DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS

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Division 1

General Requirements

Division 1

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GENERAL REQUIREMENTS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for "Expand Building 1 For PACT, Ambulatory Care, Radiology, and Egress Stair at the Iowa City VA Health Care System as required by drawings and specifications.

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

C. Offices of

Heery International, Inc.

125 South Dubuque St. Suite 500

Iowa City IA, 52240

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

D. Not Used.

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 a OSHA designated "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. **All employees of general contractor or subcontractors shall have the 10-hour or 30-hour OSHA Construction Safety course** and other relevant competency training, as determined by RE/COR acting as the Construction Safety Officer with input from the facility Construction Safety Committee.

2. Submit training records of all such employees for approval before the start of work.

H. VHA Directive 2011-36, Safety and Health during Construction, dated 9/22/2011 in its entirety is made a part of this section

1.2 STATEMENT OF BID ITEM(S)

A. Not Used.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. AFTER AWARD OF CONTRACT, 0 sets of specifications and drawings will be furnished. Contractor responsible for duplication of ALL project drawings, specifications, and construction time correspondence.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.

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

B. Security Procedures:

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

2. For working outside the “regular hours” as defined in the contract, The General Contractor shall give 3 days notice to the Contracting

Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.

3. No photography of VA premises is allowed without written permission of the Contracting Officer.

4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Guards: Not Used.

D. Key Control:

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

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

E. Document Control:

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

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

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

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

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

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

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

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

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

F. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.

2. Separate permits shall be issued for General Contractor and its employees for parking in designated areas only. Only 1 permit per General Contractor or Sub Contractor shall be issued. Carpooling is highly encouraged as parking on site is extremely limited.

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):

E84-2009.....Surface Burning Characteristics of Building Materials

2. National Fire Protection Association (NFPA):

   10-2010.....Standard for Portable Fire Extinguishers

   30-2008.....Flammable and Combustible Liquids Code

   51B-2009.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

   70-2011.....National Electrical Code

   241-2009.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

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

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Project Manager for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor’s competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Project Manager that individuals have undergone contractor’s safety briefing.

C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).

E. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, 45 minute fire/smoke rated doors with self-closing devices and combination style locking devices.

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

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

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

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

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

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.

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

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

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

O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Manager. Obtain permits from facility Project Manager daily.

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

Q. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

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

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

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 Project Manager. 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 Project

Manager and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

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

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

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

F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Project Manager where required by limited working space.

1. Do not store materials and equipment in other than assigned areas.

2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.

3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

G. Phasing: To insure such executions, Contractor shall furnish the Project Manager 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 Project Manager two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Medical Center Director, Project Manager and Contractor, as follows:

Phase 1: Begin work in the level 3 Chapel Renovation (1-A9) and Conference Room 3W101A/ 3W101B Operable Partition (1-A21). Construct new columns to support Ambulance Garage beams (1-A4). Demolition of existing Chapel may commence only after completion of Renovate Chapel, installation of Columns and Opening of Temporary Walkway Access to existing MRI Wing at Level 1 (1W71-1W77), Emergency Department and emergency egress must be maintained throughout construction. Site Work that does not interfere with operation of Iowa City Healthcare System may begin in this phase.

Phase 2: Construct new Shell and Emergency Department Fit-Out (with the exception of Triage Room 1W200B (1-A4). This phase also includes all Site Work, connection to south egress Stair 1ST14 and completion of the structure over the temporary walkway.

Phase 3: Following completion of Emergency Department commence demolition of existing Emergency Department and portion of Primary Care for Renovation shown in 1-A4. Construct Emergency Department Triage Room 1W200B retain access to other existing Primary Care functions at all times.

Phase 4: Demolish east portion of existing Primary Care and Renovate as shown in 1-A4. Retain access to Pharmacy at all times.

Phase 5: Complete Demolition and Renovation of remaining portions of Primary Care space.

H. Building No. 1 will be occupied during performance of work; but immediate areas of alterations will be vacated.

1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas 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 Affairs 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.

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

J. When a building is turned over to Contractor, 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.

K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone),

they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Project Manager.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Project Manager. 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 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY for additional requirements.

2. Contractor shall submit a request to interrupt any such services to Project Manager, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

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

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

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

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

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

be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

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

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever 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, walks and entrances must be approved by the Project Manager.

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

O. Not Used.

1.7 ALTERATIONS

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

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of building.

2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.

3. Shall note any discrepancies between drawings and existing conditions at site.

4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Project Manager.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Project Manager, 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" and "CHANGES".

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

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

D. Protection: Provide the following protective measures:

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

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

3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately

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

1.8 INFECTION PREVENTION MEASURES

A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded. See Appendix 1 to this section.

B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Project Manager 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.

C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. In addition:

   1. The PM and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.

   2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.

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

1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Project Manager. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.

2. Do not perform dust producing tasks within occupied areas without the approval of the Project Manager. 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 one-hour temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Barriers shall be sealed and made to match existing finishes on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Use of a combination style door lock is required to maintain construction site security. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Project Manager and Medical Center.

   b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.

   c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats

shall be changed as often as required to maintain clean work areas directly outside construction area at all times.

d. Vacuum and wet mop all transition areas from construction to the occupied medical center at a minimum 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. Dry sweeping is not allowed.

e. The contractor shall not haul debris through patient-care areas without prior approval of the Project Manager and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.

f. Using a HEPA vacuum, clean inside the barrier and vacuum ceiling tile prior to replacement. Any ceiling access panels opened for investigation beyond sealed areas shall be sealed immediately when unattended.

g. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.

h. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

E. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.

2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.

3. All new air ducts shall be cleaned prior to final inspection.

1.9 DISPOSAL AND RETENTION

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

1. Reserved items which are to remain 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 Project Manager.

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

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

4. PCB Transformers: The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors. The transformers and capacitors 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 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 Chief.

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 site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the

careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

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

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

1.11 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Project Manager. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Project Manager 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" and "DIFFERING SITE CONDITIONS".

1.12 PHYSICAL DATA

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

1. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by Terracon Consultants, Inc.

B. A copy of the soil report will be made available for inspection by bidders upon request to the Engineering Officer at the VA Medical Center, Iowa City, Iowa, and shall be considered part of the contract documents.

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

1.13 PROFESSIONAL SURVEYING SERVICES

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

1.14 LAYOUT OF WORK

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

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, roads, parking lots, are in accordance with lines and elevations shown on contract drawings.

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

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

D. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major

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

1. Lines of each building and/or addition.

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

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

4. Not used.

5. Lines of elevations of all swales and interment areas.

6. Lines and elevations of roads, streets and parking lots.

E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to Project Manager.

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

1.15 AS-BUILT DRAWINGS

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

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

C. Contractor shall deliver two approved completed sets of as-built drawings to the Project Manager within 15 calendar days after each

completed phase and after the acceptance of the project by the Project Manager.

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

1.16 USE OF ROADWAYS

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

B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.

C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.17 PROJECT MANAGER'S FIELD OFFICE

Not Used.

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 by Project Manager. If the equipment is not installed and maintained in accordance with the following provisions, the Project Manager will withdraw permission for use of the equipment.

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their

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

3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.

4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.

5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.

6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.

B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, 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. Use of existing freight elevator for handling building materials and Contractor's personnel will be permitted subject to following provisions:

1. Contractor makes all arrangements with the Project Manager for use of elevators. The Project Manager will ascertain that elevators are in proper condition. Contractor may use freight elevator in Building 1 for daily use between the hours of 7:00am and 4:30pm and for special nonrecurring time intervals when permission is granted. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.

2. Contractor covers and provides maximum protection of following elevator components:

   a. Entrance jambs, heads soffits and threshold plates.

   b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.

   c. Finish flooring.

3. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes.

4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining.

5. 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 USE OF NEW ELEVATORS

Not Used

1.21 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 Project Manager, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.22 AVAILABILITY AND USE OF UTILITY SERVICES

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

B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

C. Not Used

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:

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 Project Manager's discretion) of use of water from 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 Project Manager's discretion), of use of steam from the Medical Center's system.

H. Fuel: Natural and LP gas and 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 shall be furnished by the Contractor at Contractor's expense.

1.23 NEW TELEPHONE EQUIPMENT

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

1.24 TESTS

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

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

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

D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.

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

1.25 INSTRUCTIONS

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

B. Manuals: Maintenance and operating manuals and one compact disc (three hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the Project Manager coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all

component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Project Manager and shall be considered concluded only when the Project Manager is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Project Manager, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.26 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, the Government-furnished property shown on the drawings.

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

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

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

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.

2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.

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

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

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

1.27 RELOCATED ITEMS

A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing items indicated by symbol "R" or otherwise shown to be relocated by the Contractor.

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

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

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

E. Not Used

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.

1.28 NOT USED

1.29 CONSTRUCTION SIGN

A. Provide a Construction Sign where directed by the Project Manager. All wood members shall be of framing lumber. Cover sign frame with 0.7 mm (24 gage) galvanized sheet steel nailed securely around edges and on all bearings. Provide three 100 by 100 mm (4 inch by 4 inch) posts (or equivalent round posts) set 1200 mm (four feet) into ground. Set bottom of sign level at 900 mm (three feet) above ground and secure to posts with through bolts. Make posts full height of sign. Brace posts with 50 x 100 mm (two by four inch) material as directed.

B. Paint all surfaces of sign and posts two coats of white gloss paint. Border and letters shall be of black gloss paint, except project title which shall be blue gloss paint.

C. Maintain sign and remove it when directed by the Project Manager.

1.30 SAFETY SIGN

A. Provide a Safety Sign where directed by Project Manager. Face of sign shall be 19 mm (3/4 inch) thick exterior grade plywood. Provide two 100 mm by 100 mm (four by four inch) posts extending full height of sign and

900 mm (three feet) into ground. Set bottom of sign level at 1200 mm (four feet) above ground.

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

C. Maintain sign and remove it when directed by Project Manager.

D. Standard Detail Drawing Number SD10000-02(Found on VA TIL) of safety sign showing required legend and other characteristics of sign is available upon request.

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

1.31 PHOTOGRAPHIC DOCUMENTATION

A. During the construction period through completion, provide photographic documentation of construction progress and at selected milestones.

B. Photographic documentation elements:

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

2. Before construction, the building pad, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building pad and site shall be documented.

3. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every thirty (30) calendar days ("Progressions").

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

5. As-built conditions of mechanical, electrical, plumbing and all other systems shall be documented post-inspection and pre-insulation, sheet rock or dry wall installation. This process shall include all finished systems located in the walls and ceilings of all buildings at the Project.

6. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the Project Manager in order to capture pre-determined focal points, such as waterproofing, window flashing, radiused steel work, architectural or Exterior Insulation and Finish Systems (EIFS) detailing.

7. As-built finished conditions of the interior of each building including floors, ceilings and walls shall be documented at certificate of occupancy or equivalent, or just prior to occupancy, or both, as directed by the Project Manager.

1.32 FINAL ELEVATION DIGITAL IMAGES

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

B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures. Pictures shall be 400 mm x 500 mm (16 by 20 inches), printed on regular weight paper, matte finish archival grade photographic paper and produced by a RA4 process from the digital image with a minimum 300 PPI. Identifying data shall be carried on label affixed to back of photograph without damage to photograph and shall be similar to that provided for final construction photographs.

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

SRE will select one style to frame all six prints. Photographs with frames shall be delivered to the Project Manager in boxes suitable for

1.33 HISTORIC PRESERVATION

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

- - - E N D - - -

Appendix 1: Risk Assessment Forms

Attachment A-1

Construction Risk Assessment

Project Name: EXPAND B.1 FOR PACT, ED, RAD, STAIR | Planned Project Start Date: FY 14

Location of Construction: WEST END OF BLDG 1 | Estimated Duration: 400 DAYS

Types of Contractor(s)Performing Work: EARTHWORK, GENERAL CONSTRUCTION, MECH, ELECTRICAL, COMMUNICATIONS, ETC.

Safety/Life Safety Risk Assessment-Safety officer should be involved in the design/planning of all projects

Y	N	LIFE SAFETY IMPACTS OF PROJECT	If NO, indicate ILSM from below list or describe other intervention
X		Will exit egress routes from occupied areas remain unchanged?	EGRESS STAIRS (SEE BELOW)
	X	Will exit stairs remain unobstructed & fire separated?	1. 6. 7. 11.
	X	Will fire & smoke compartments remain intact & unchanged?	1 4 6 7 8 9 12.
	X	Will fire alarm detection systems remain functional & unimpaired?	1 4 6 7 8 9 12.
	X	Will fire alarm suppression systems remain functional & unimpaired?	1 4 6 7 8 9 12
X		Will construction area be separated by non-combustible smoke tight partitions?	
X		Will access to emergency department remain unobstructed?	
X		Will emergency access by fire department remain unobstructed?	
Y	**N**	**CONSTRUCTION ACTIVITY**	**If YES, indicate ILSM from below list or describe other intervention**
X		Will there be any anticipated utility shutdowns? (Communications, electrical, heating/cooling, HVAC, medical gases, vacuum, water, server)	COORDINATE W/ STAFF
X		Will there be unusual noise levels for adjacent areas?	" " "
	X	Will vibration levels be excessive for hospital machinery to operate properly?	
	X	Will there be excessive distance to exit?	
	X	Will there be hazardous area not protected?	
	X	Will there be conflicts with emergency disaster plan?	
Y	**N**	**PHYSICAL SECURITY IMPACTS**	**If YES, describe necessary intervention(s)**
	X	Will the construction compromise security?	
Y	**N**	**EMPLOYEE SAFETY**	**If YES, indicate ILSM from below list or describe other intervention**
	X	Will the construction compromise employee safety?	
Y	**N**	**CONTRACT COMPLIANCE**	**If YES, describe necessary intervention(s)**
		Will contract clauses be included for enforcement of identified risks?	

Life Safety/Construction/Security/Employee Safety/Contracting Additional Requirements:

COR WILL COORDINATE WILL HOSPITAL STAFF FOR ALL UTILITY SHUT-DOWNS OR INTERRUPTIONS; THIS INCLUDES TALKING TRAFFIC HINDRANCE AND AMBULANCE ACCESS.

Interim Life Safety Measures (ISLM)

1. Egress. Ensure free and unobstructed exits.
2. Emergency Forces Access
3. Ensuring Operational Life Safety Systems
4. Temporary Construction
5. Additional Fire Fighting Equipment
6. Prohibit Smoking
7. Control Combustible Loading
8. Conduct 2 Fire Drills Per Shift in Local Area
9. Increase Hazard Surveillance
10. Compartmentation Training of Personnel
11. Conduct Organization Training on Life Safety
12. Notify Fire Department of system impairment
13. Install temporary suppression or Detection system

Safety Manager:	Date: 20 April 2013
Project Manager/COTR:	Date: 20 Apr '13
Police and Security:	Date: 21 Apr 13
AFGE Union:	Date: 21 June 2013
Contracting:	Date:

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Attachment A-1(Cont)

INTERIM LIFE SAFETY MEASURES (ILSM) DECISION GRID
FOR THE IOWA CITY VETERANS AFFAIRS MEDICAL CENTER

LEVEL	IF THESE CONDITIONS EXIST	THEN IMPLEMENT THESE ILSMs
Level 1 (basic risks)	Disruption in the alarm, detection, or suppression systems for more than four hours in a twenty four hour period	ILSMs 4, 6, 7,9 and 12
Level 2 (intermediate risks)	Level 1 conditions, plus exits are disrupted, and/or emergency access limited or impaired, and/or evacuation routes disrupted	ILSMs 1, 2, 4, 6, 7, 9, 11 and 12
Level 3 (major risks)	Level 2 conditions, plus structural or compartmental features are compromised, and/or exit access is through a construction area, and/or access for emergency services is through a construction area	ILSMs 1 through 12

1. Project Manager must ensure free and unobstructed exits. Personnel must receive additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Personnel or designees must inspect the means of exiting from construction areas daily.

2. Project Manager must ensure free and unobstructed access to emergency services and for fire, police, and other emergency forces.

3. Supervisor, Facility Management must ensure that fire alarm, detection, and suppression systems are in good working order.

4. Project Manager must ensure that temporary construction partitions are smoke-tight and built of noncombustible or limited combustion materials that will not contribute to the development or spread of fire.

5. Supervisor, Facility Management must provide additional fire fighting equipment and train personnel in its use.

6. Safety Manager, Supervisor Facility Management, and Project Manager must work together to prohibit smoking according to EC.5 throughout its buildings, as well as in and adjacent to construction areas.

7. Supervisor, Facility Management and Safety Manager must develop and enforce storage, housekeeping, and debris removal to reduce the building's flammable and combustible fire load to the lowest feasible level.

8. Safety and Occupational Health Specialist must conduct a minimum of two fire drills per shift each quarter.

9. Safety Manager, Supervisor Facility Management, and Project Manager must work together to increase hazard surveillance of buildings, grounds, and equipment, with special attention given to excavations, construction areas, construction storage, and field offices.

10. Supervisor, Facility Management and Safety Manager must train personnel to compensate for impaired structural or compartmental fire safety features.

11. Safety Manager must conduct organization-wide safety education programs to promote awareness of life safety deficiencies, construction hazards, ILSMs.

12. Safety Manager in coordination with Project Manager will provide notification to Iowa City Fire Department when fire detection or fire suppression system is impaired for more than 4 hours.

13. Facilities shall ensure a temporary but equivalent system is provided when any fire detection or fire suppression system becomes impaired in such a manner as to be non-operational or non-effective for its designed purpose. Personnel or designees must inspect and test temporary systems monthly.

Attachment A-2 (Cont)

Construction Project Activity

TYPE A	**Inspection and Non-Invasive Activities** Includes, but is not limited to: • Removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet. • Painting (but not sanding). • Wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls. • Access to ceilings or chase spaces for visual inspection.
TYPE B	**Small scale, short duration activities which create minimal dust, noise, vibration, short utility outages (1-4 hrs.)** Includes, but is not limited to: • Installation of telephone and computer cabling including removal of multiple ceiling tiles. • Cutting, sanding, or demolition of walls, ceilings, or floors where dust migration can be contained within 50 square feet, or contained to one room. • Noise: Maximum- small chipping or hammer-drill, less than 4 hours. • Utility outage 1-4 hours water, electrical, med. Gas, HVAC.
TYPE C	**Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies, high noise and vibration, utility outage 4-8 hrs.** Includes, but is not limited to: • Sanding of walls for painting or wall covering. • Removal of walls, floor coverings, entire ceiling systems, extensive cutting or sanding in areas greater than 50 square feet and where more than one room is affected. • New wall construction. • Duct work, electrical work, cabling etc. above ceilings where multiple ceiling tiles are removed along with aggressive activity within the ceiling space. • Noise: small tools i.e. hammer drill up to 8 hours, or any large jack hammer. • Water, sewer, power, HVAC, med. Gas, outages up to 8 hours.
TYPE D	**Major demolition and construction projects** Includes, but is not limited to: • Construction, noise, and utility outages which require consecutive work shifts. • Heavy demolition over a large area, including removal of walls floors ceilings or complete utility systems, where separation from occupied areas is difficult. • New construction.

Occupant/Patient Risk Groups

Low Risk	Medium Risk	High Risk	Highest Risk
• Single Office • Storage • Machine Rooms • Shops	• Physical Therapy • Radiology • Connecting Corridors • Office Suites • Psychiatry • CDC • Dom • Outpatient Clinic B1, B28, B111	• Laboratories (specimen) • Outpatient Surgery • Specialty Clinic • Pharmacy • Endoscopy • Respiratory Therapy • NHCU • Sub-acute unit • Kitchen	• Any area caring for immunocompromised patients • Central Sterile Supply • Negative pressure isolation rooms • Vent Unit

IC Matrix - Class of Precautions: Construction Project by Occupant/Patient Risk

Construction Project Type

Occupant/Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III/IV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III/IV	IV
HIGHEST Risk Group	II	II	III/IV	IV

Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate that **Class III** or **Class IV** control procedures are necessary.

Attachment A-2

Infection Control Risk Assessment

Location and type of construction: VACT Expand Bldg 1	Project Start Date: FALL '14
Project Manager: MICHELE MILLERS	Estimated Duration: 540 days
Supervisor of Area: MULTIPLE	Date notified of project:

YES	NO	CONSTRUCTION ACTIVITY	YES	NO	INFECTION CONTROL RISK GROUP
	X	TYPE A: Inspection, non-invasive activity.		X	GROUP 1: Least Risk
	X	TYPE B: Small scale, short duration, minimal dust generating activity.		X	GROUP 2: Medium Risk
	X	TYPE C: Activity that generates moderate to high levels of dust, requires greater than one work shift for completion.		X	GROUP 3: Medium/High Risk
X		TYPE D: Major duration and construction activities requiring consecutive work shifts.	X		GROUP 4: High Risk

Class: Class determined by completing above and referring to FM-01 (Red Book) Section II Chapter 7, Risk Assessment Matrix of Precautions for Construction and Renovation.

CLASS I (Circle all that apply)
1. Execute work by methods to minimize raising dust from construction operations.
2. Immediately replace a ceiling tile displaced for visual inspection

CLASS II (Circle all that apply)
1. Use tools equipped with dust collectors.
2. Seal unused doors with tape.
3. Block off and seal air vents.
4. Remove or isolate HVAC system in areas where work is being performed.
5. Utilize air filtration machine
6. Water mist work surfaces to control dust while cutting.
7. Place dust mat at entrance and exit of work area.
8. Wipe work surfaces with disinfectant.
9. Contain construction waste before transport in tightly covered containers.
10. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
11. Remove isolation of HVAC system in areas where work is being performed.

CLASS III (Circle all that apply)

Obtain infection control approval before construction begins.
1. Implement measures from Class II above, plus.
2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area before construction begins. * Consider off-shift work if critical barrier is not constructed.
3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.
4. Cover transport receptacles or carts. Tape covering unless solid lid. Implement measures from Class II above, plus.
5. Do not remove barriers from work area until completed project is inspected by Safety Section & Infection Control & thoroughly cleaned by Facilities Management.
6. Contain construction waste before transport in tightly covered containers.
7. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
8. Vacuum work area with HEPA filtered vacuums.
9. Wet mop area with disinfectant.
10. Remove isolation of HVAC system in areas where work is being performed.

CLASS IV (Circle all that apply)

Obtain infection control approval before construction begins.
1. Consider off-shift work.
2. Consider Moving Patients out of area.
3. Implement measures from Class III above, plus
4. Construct anteroom and require all personnel and tools etc. to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.
5. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.
6. Do not remove barriers from work area until completed project is inspected by Safety Section & Infection Control & thoroughly cleaned by Facilities Management.
7. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.
8. Contain construction waste before transport in tightly covered containers.
9. Cover transport receptacles or carts. Tape covering unless solid lid
10. Vacuum work area with HEPA filtered vacuums.
11. Wet mop area with disinfectant.
12. Remove isolation of HVAC system in areas where work is being performed.

Exceptions/Additional requirements to this permit are noted by comments or attached memoranda:

Infection Control Manager:	Date:		
Nicole Geiders	4/19/13		

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Attachment A-3

Expand Bldg 1 for PACT

Patient Safety Risk Assessment

Y	N	CONSTRUCTION ACTIVITY
✓	✓	Does this project involve a patient care area?
✓		Is this project adjacent to a patient care area?
✓		Will this project alter patient access/egress to/from the building/patient care area, either temporarily or permanently?
✓		Will this project Impact utilities serving patient care areas?

If any are YES, **the patient safety manager shall further assist in design/planning**, especially with regard to the following items:

Access/ Egress	1. The new/temporary access/egress path should be intuitive, i.e. easy to follow. 2. Signage should be adequate for decreased visual acuity and at appropriate viewing levels for both ambulating and w/c bound patients/visitors. 3. The access/egress path should be smooth, without tripping hazards. 4. The access/egress path should be handicap accessible. 5. For applicable clinical areas, the construction barriers prevent unauthorized patient egress.
Hazardous Areas/ Materials	1. Hazardous areas should not be accessible by patients/visitors. 2. Signage for hazardous areas should be visually adequate (see above). 3. Hazardous chemicals and tools should be stored appropriately to preclude patient/visitor access?
Critical Alarms	**Critical clinical alarms should be functional and audible within and adjacent to the construction zone? Including but not limited to:** a. Emergency Code Systems b. Medical Gas alarms (Oxygen, Air, Suction) c. Wander guard technology d. Cardiac and other vital sign Monitoring Systems e. Medication/Nutrition Delivery Systems f. Nurse Call Systems

Patient Safety Additional Requirements

- Ensure communication is reported to pt care areas when "shut downs" occur.
- Ensure proper postings are marked -> "hazards".

Patient Safety:	Date:
[illegible]	4.19.13

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

1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION and, SPECIAL NOTES, in GENERAL CONDITIONS.

1-2. For the purposes of this contract, samples (including laboratory samples to be tested, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.

1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Project Manager on behalf of the Contracting Officer.

1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES and CHANGES - SUPPLEMENT of the GENERAL CONDITIONS.

1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples require by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.

B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.

1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.

1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.

2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to both Project Manager and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
5. Laboratory test reports shall be sent directly to Project Manager for appropriate action.
6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

E. Approved samples will be kept on file by the Project Manager at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
   1. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

G. Electronic Submittal Procedures:
   1. Summary:
      a. Shop drawing and product data submittals may be transmitted to Architect in electronic (PDF) format using a website service designed specifically for transmitting submittals between construction team members, such as Submittal Exchange.

b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.

2. Procedures:

a. Submittal Preparation – Contractor may use any or all of the following options:

1) Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via the website.

2) Subcontractors and Suppliers provide paper submittals to General Contractor who electronically scans and converts to PDF format.

3) Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.

b. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.

c. Contractor shall transmit each submittal to Architect using the website.

d. Architect / Engineer review comments will be made available on the website for downloading. Contractor will receive email notice of completed review.

e. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the contractor.

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

Heery International Inc. (Architect-Engineer)

125 S. Dubuque St., Suite 500

Iowa City, IA 52240

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

1-12. Samples (except laboratory samples) for approval shall be sent to Architect-Engineer, in care of Project Manager:

Iowa City VA Medical Center

601 Highway 6 West

Iowa City, IA 52246

1-13 SUBMITTAL SCHEDULE

A. Reference the accompanying Shop Drawing and Submittal Log at the end of this

section for required submittal information.

- - - E N D - - -

SHOP DRAWING AND SUBMITTAL LOG

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
014529	Test Reports, Certification of Accreditation									
015719	Environmental Protection Plan									
017419	Demolition Debris Mgmt Plan, Monthly Summary of Diverted Demolition Debris									
018111	Sustainable Design Submittals, Project Materials Cost Data, Construction IAQ Mgmt Plan, Substantial Completion Documentation, Sustainable Design Progress Reports									
033000	Shop Drawings, Mill Test Reports, Manufacturer's Certificates, Test Report for Conc. Mix Design, Shoring and Re-Shoring Sequence									
040513	Materials Certificates, Lab Test Reports									
042000	Samples, Shop Drawings, Materials Certificates									
047200	Samples, Shop Drawings, Materials Certificates, Mfr's Test Results, Lab Data, List of Jobs by Mfr.									
051200	Shop and Erection Drawings, Shop Paint Certificate, Test Reports, Design Calculations and Drawings, Record Surveys									
053100	Shop Drawings, Manufacturer's Data									
054000	Shop Drawings, Manufacturer's Data, Structural Analysis Signed by PE, Delegated Design Calculations and Structural Data									
055000	Shop Drawings, Manufacturer's Certificates, Design Calculations, Setting Drawings and Instructions									
055100	Shop Drawings, Delegated Design Calculations and Structural Data									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
061000	Shop Drawings									
061663	Samples, Product Data									
062000	Shop Drawings, Samples, Certificates, List of Acceptable Sealers for									
071113	Mfr's Data									
071352	Mfr's Qualifications, Mfr's Data, Certificates									
072113	Mfr's Data, Certificates									
072119	Mfr's Certifications, Product Data, Samples, Installation Instructions, Shop Drawings, Warranty, Mfr's Compatibility Letter									
072200	Product Data, Sustainable Design Submittals, Shop Drawings, Samples, Certificates, Lab Test Reports, Tapered Roof System Layout, Supervisors Qualifications Documentation									
072400	Samples, Test Reports, Mfr's Data									
074219	Product Data, Shop Drawings, Samples, Coordination Drawings, Qualification Data, Product Test Reports, Maintenance Data, Warranties									
075323	Applicators Approval Certification, Shop Drawings, Mfr's Installation Instructions									
076000	Shop Drawings, Certificates									
078100	Mfr's Data, Certificates, Mfr's Approval of Surfaces, Completed Installation and Applicators									
078400	Mfr's Data, Mfr's Installation Instructions, List of FM, UL Classification Number of Systems Installed, Certified									

	Lab Test Reports									
Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
079200	Mfr's Installation Instructions, Cured Samples, Mfr's Data									
079513	Mfr's Data, Certificates, Shop Drawings, Samples									
081113	Mfr's Data									
081400	Samples, Shop Drawings, Mfr's Data, Lab Test Reports									
081720	Shop Drawings, Samples, Installation Instructions									
083100	Shop Drawings, Certification of Door & Frame Construction, Maintenance Data									
083113	Shop Drawings, Mfr's Data									
083313	Mfr's Data, Shop Drawings									
083613	Shop Drawings, Mfr's Data, Certificates									
084113	Shop Drawings, Mfr's Data, Samples, Mfr's Certificates									
084413	Mfr's Product Data, Shop Drawings, Samples, Quality Control Submittal, Mfr's Certificates, Mfr's Field Reports									
085113.11	Samples, Shop Drawings, Test Reports/ Mfr's Certificates									
087100	Hardware Schedule, Certificates of Compliance, Test Reports									
088000	Mfr's Certificates, Warranty, Mfr's Data, Samples, Preconstruction Adhesion & Compatibility Test Report									
089000	Shop Drawings, Mfr's Data									
090600	Samples for Color Approval									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
092216	Mfr's Data, Shop Drawings, Test Reports									
092900	Mfr's Data, Shop Drawings, Test Reports									
093013	Samples, Product Data, Certifications									
095100	Mfr's Data, Mfr's Certificates									
095800	Shop Drawings, Product Data, Samples, Certification									
096513	Mfr's Data, Samples									
096516	Mfr's Data, Samples									
096519	Mfr's Data, Samples, Shop Drawings, Test Reports									
096723.20	Mfr's Data, Samples, Shop Drawings, Certifications & Approvals, Warranty									
096800	Product Data, Samples, Shop Drawings, Maintenance Data									
099100	Mfr's Data, Sample Panels, Sample of Identity Markers, Mfr's Certificates									
101113	Shop Drawings, Mfr's Data, Samples									
101123	Shop Drawings, Mfr's Data, Samples									
102123	Samples, Shop Drawings, Mfr's Data									
102213	Shop Drawings, Layout & Erection Drawings & Specifications									
102226	Shop Drawings, Samples, Mfr's Data, Test Reports, Mfr's Certificates									
102600	Shop Drawings, Mfr's Data, Test Report									
102800	Shop Drawings, Mfr's Data, Mfr's Certificates									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
104400	Mfr's Data									
123200	Mfr's Data, Samples, Shop Drawings									
210511	Mfr's Data, Coordination Drawings, Maintenance Data & Operating Instructions									
211313	Delegated Design Drawings Stamped by PE, Installer Qualifications, Mfr's Data, Calculations, Final As-Built Drawings, Testing Instructions, Maintenance Instructions, Materials and Testing Certificate, Instruction Manual									
220511	Shop Drawings, List of Previous Installations, Mfr's Data, Coordination Drawings, Maintenance Data & Operating Instructions									
220512	Shop Drawings, O&M Manuals, Certification									
220523	Mfr's Data									
220711	Shop Drawings									
221100	Mfr's Data									
221123	Mfr's Data, Certified Copies of Test Data, O&M Manuals									
221300	Mfr's Data, Shop Drawings									
221400	Mfr's Data, Shop Drawings									
221429	Mfr's Data, Certified Copies of Test Data, O&M Manuals									
223500	Mfr's Data									
224000	Mfr's Product Data									
226200	Mfr's Data, Mfr's Letter of Compliance, Certification									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
226300	Mfr's Data, Mfr's Letter of Compliance, Certification									
230511	Contractor Certification of Coordination, List of Previous Installations, Shop Drawings, Layout Drawings, Mfr's Data, Maintenance Data & Operating Instructions, Submittals to TAB Contractor									
230512	Shop Drawings, O&M Manuals, Certification									
230513	Information Submittals									
230541	Mfr's Data, Load Calculations for Isolators Selection									
230593	Names & Qualifications, Information of 3-Completed Projects, AABC or NEBB Publications, Design Review Report, Systems Inspection Report, Duct Leak Test Report, Systems Readiness Report, Intermediate & Final Reports									
230711	Shop Drawings									
230923	Mfr's Data, Shop Drawings, Product Certifications, Licenses, As-Built Control Drawings, O&M Manuals, Performance Report									
232113	Mfr's Data, Mfr's Certified Data Report, Mfr's Certificates, Welder's Certification, Coordination Drawings, As-Built Piping Diagrams									
232123	Mfr's Data, Mfr's Maintenance, Installation & Operating Instructions, Characteristic Curves									
232213	Mfr's Data, Mfr's Certified Data Report, Coordination Drawings, As-Built Piping Diagrams									
232223	Mfr's Data, Mfr's Maintenance, Installation & Operating Instructions,Characteristic Curves									
232500	Mfr's Data, Water Analysis Verification, MSDS, Maint. & Operating Instructions									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
233100	Mfr's Data, Coordination Drawings									
233400	Mfr's Data, Certified Sound Power Levels, Motor Ratings, Roof Curbs, Belt Guards, O&M Manuals, Certified Performance Curves									
233600	Mfr's Data, Certificates, O&M Manuals									
233700	Mfr's Data, Coordination Drawings									
234000	Mfr's Data, Air Filter Performance Reports, Suppliers Warranty, Field Test Results for HEPA Filters									
237200	Mfr's Data, Certificate, Application Ratings, Installation, Maintenance & Operating Instructions									
237300	Mfr's Data, O&M Manuals									
238200	Mfr's Data, Certificates, O&M Manuals									
238216	Mfr's Data, Installation, Operating & Maintenance Instructions, Certification Compliance									
260511	Shop Drawings, Mfr's Data, Compliance Information, Wiring Diagrams, O&M Manuals									
260521	Mfr's Data, Certifications									
260526	Shop Drawings, Test Reports, Certifications									
260533	Mfr's Data, Shop Drawings, Certifications									
262416	Shop Drawings, O&M Manuals, Certification									
262726	Shop Drawings, O&M Manuals, Certifications									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
262911	Shop Drawings, O&M Manuals, Certification									
262921	Shop Drawings, O&M Manuals, Certifications									
264100	Shop Drawings, Installer Qualifications, Certification									
265100	Product Data, O&M Manuals, Certifications									
270511	O&M Manuals, Samples,									
270526	Shop Drawings, Test Reports, Certifications									
270533	Shop Drawings, Certification									
271000	Mfr's Data, Certificates									
274131	Equipment Drawings, Product Data, Equipment List, Head End & Interface Cabinet Layout Drawing, Engineering Drawings, As-Built Drawings									
275116	Qualifications									
275223	Qualifications									
275241	O&M Manuals, Certifications, Mfr's Data & Drawings									
280513	Mfr's Data, Certificates, Shop Drawings, Wiring Diagrams, Cable Administration Drawings, Maintenance Data, Project Planning Documents									
280526	Shop Drawings, Test Reports, Certifications									
280528.33	Shop Drawings, Certification, Completed System Readiness Checklists, Product Data, Coordination Drawings									
281611	Drawings for Device Identification, Signal & Power Conduit Runs									

Section	Description	Date Received	#	Date Sent to Cons.	Date Returned	Remarks	Date Returned	Contractor	Copies To Owner	File
281611	Drawings for Device Identification, Signal & Power Conduit Runs & Sizes, Riser Drawing									
282300	Certificates of Compliance, Pre-Installation and As-Built Documents, Drawings, Riser Drawing, System Drawing, Schedule, Detail & Elevation Drawings, Product Data, Mfr's Certification, O&M Manuals									
283100	Drawings, Certifications,									
312000	Personnel Resumes, Soil Samples									
312319	Drawings & Data, Inspection Reports, All Required Permits									
313116	Product Data, Qualification Data, Warranty									
316326	Detailed Location Plan & Description of Caisson Installation, Shop Drawings, Detailed Plan with Load Test Arrangement, Reports, Certificates, Independent Testing and Inspection, Qualification Data, Drawings of Actual In-Place Caisson Locations, Record Drawings									
320523	Mfr's Certificates and Data, Data & Test Reports									
321723	Mfr's Certificates and Data									
329000	Product Data, Samples & Mfr's Literature, Qualification Data, Notorized Certificates of Compliance, Material Test Reports, Maintenance Instructions									
331000	Mfr's Data, Testing Certificates									
334000	Mfr's Data									

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 (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 (JUN 1988)

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

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

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (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.etl.com

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IPCEA Insulated Power Cable Engineers Association

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

D. American Welding Society (AWS):

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

1.3 REQUIREMENTS:

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory’s scope of accreditation must include

the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

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

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

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

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Project Manager regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Project Manager extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
2. Provide full time observation of fill placement and compaction and field density testing in building areas and provide full time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.

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

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D6938 wherever possible. Field density tests utilizing ASTM D1556, or ASTM D2167 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 Project Manager before the tests are conducted.
   a. Building Slab Subgrade: At least one test of subgrade for every 2000 square feet of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 2000 square feet of overlaying building slab, but in no case fewer than three tests.
   b. Foundation Wall Backfill: One test per 100 feet of each layer of compacted fill but in no case fewer than two tests.
   c. Pavement Subgrade: One test for each 400 square yards, but in no case fewer than two tests.
   d. Curb, Gutter, and Sidewalk: One test for each 300 feet, but in no case fewer than two tests.
   e. Trenches: One test at maximum 100 foot intervals per 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 Project Manager. In each compacted fill layer below wall footings, perform one field density test for every 100 feet of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.

C. Fill and Backfill Material Gradation:

1. Paved and Building Slab Areas: At subgrade and at each layer of compacted fill and backfill, at least one test for every 2,000 sq. ft.

or less of paved or building slab area, but in no case fewer than 3 tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 ft. or less of wall length, but no fewer than 2 tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.

4. Gradation of fill and backfill material shall be determined in accordance with ASTM C136.

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

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

3.2 FOUNDATION CAISSONS:

A. Concrete Testing: Test concrete including materials for concrete as required in Article, CONCRETE of this section, except make two test cylinders for each day's placement of concrete.

B. Maintain a record of concrete used in each caisson. Compare records with calculated volumes.

C. Inspect sides and bottom of each caisson for compliance with contract documents.

D. Submit a certified “Caisson Field Record” for each caisson, recording actual elevation at bottom of shaft; final center line location of top; variation of shaft from plumb; results of all tests performed; actual allowable bearing capacity of bottom; depth of socket into rock; levelness of bottom; seepage of water; still water level (if allowed to flood); variation of shaft (from dimensions shown); location and size of reinforcement, and evidence of seams, voids, or channels below the bottom. Verify the actual bearing capacity of the rock strata by the use of a calibrated penetrometer or other acceptable method.

E. Caissons Bearing on Hardpan: Take undisturbed samples, suitable for tests required, from caisson bottom. Make auger probe to a depth of 8 feet below bottom and visually inspect and classify soil. Verify continuity of strata and thickness.

3.3 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 Project Manager.

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 one batch plant inspection and report results to Project Manager.
2. 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 six cylinders for each 50 cubic yards or less of each concrete type, and at least six cylinders for any one day's pour for each concrete type. Label each cylinder with an identification number. Project Manager 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. 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 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 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 Project Manager 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 two cylinders at 7 days and two cylinders at 28 days. Use remaining two cylinders as a spare tested as directed by Project Manager. Compile laboratory test reports as follows: Compressive strength test shall be result of the average of two cylinders, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of one cylinder shall be used.
2. Furnish certified compression test reports (duplicate) to Project Manager. 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. Weather conditions during placing.
    f. Temperature of concrete in each test cylinder when test cylinder was molded.
    g. Maximum and minimum ambient temperature during placing.

h. Ambient temperature when concrete sample in test cylinder was taken.

i. Date delivered to laboratory and date tested.

3.6 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 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 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.

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

2. Bolt Inspection:
   a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
   b. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
   c. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.

d. 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 Project Manager.

3.8 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 Project Manager.

3.9 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 Project Manager.

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 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 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 Project Manager.

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

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

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
   1. Adversely effect human health or welfare,
   2. Unfavorably alter ecological balances of importance to human life,
   3. Effect other species of importance to humankind, or;
   4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

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

7. Sanitary Wastes:
   a. Sewage: Domestic sanitary sewage and human and animal waste.
   b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

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

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

1.3 REFERENCES

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

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

1.4 SUBMITTALS

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

1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the Project Manager 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 Project Manager for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
   a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
   b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
   c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
   d. Description of the Contractor's environmental protection personnel training program.
   e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's

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

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

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

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

i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.

j. Environmental Monitoring Plans for the job site including land, water, air, and noise.

k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.

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

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

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

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Project Manager. 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 50 year (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 Project Manager. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
   c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.

5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown. 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 and control spoil areas on Government property to limit spoil to areas shown and prevent erosion of soil or sediment from entering nearby water courses or lakes.
7. Protect adjacent areas from despoilment by temporary excavations and embankments.
8. 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.
9. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
10. Handle discarded materials other than those included in the solid waste category as directed by the Project Manager.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
   1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Iowa, Department of Natural Resources 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 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 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 and entering ICVA HEALTH CARE SYSTEM air intakes.

E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Project Manager. 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 6:00p.m unless otherwise permitted by local ordinance or the Project Manager. 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 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 three to six feet in front of any building face. Submit the recorded information to the Project Manager noting any problems and the alternatives for mitigating actions.

F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no

additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Project Manager. 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

1.1 DESCRIPTION

A. This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

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

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

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

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

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

PART 3 EXECUTION

3.1 INSTALLATION

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

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

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

3.2 LOCATION

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

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

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

C. Replace missing, damaged, or illegible signs.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

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

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

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

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

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

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

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
   1. Excess or unusable construction materials.
   2. Packaging used for construction products.
   3. Poor planning and/or layout.
   4. Construction error.
   5. Over ordering.
   6. Weather damage.
   7. Contamination.
   8. Mishandling.
   9. Breakage.

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

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

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

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.cwm.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 Project Manager a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
   1. Procedures to be used for debris management.
   2. Techniques to be used to minimize waste generation.
   3. Analysis of the estimated job site waste to be generated:
      a. List of each material and quantity to be salvaged, reused, recycled.
      b. List of each material and quantity proposed to be taken to a landfill.
   4. Detailed description of the Means/Methods to be used for material handling.
      a. On site: Material separation, storage, protection where applicable.
      b. Off site: Transportation means and destination. Include list of materials.
         1) Description of materials to be site-separated and self-hauled to designated facilities.
         2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
      c. The names and locations of mixed debris reuse and recycling facilities or sites.
      d. The names and locations of trash disposal landfill facilities or sites.
      e. Documentation that the facilities or sites are approved to receive the materials.

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

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

1.6 APPLICABLE PUBLICATIONS

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

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

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 COLLECTION

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

3.2 DISPOSAL

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

3.3 REPORT

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

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

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

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SECTION 01 81 11
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

This Section describes general requirements and procedures to comply with the Guiding Principles for Leadership in High Performance and Sustainable Buildings Memorandum of Understanding incorporated in the Executive Orders 13423 and 13514; Energy Policy Act of 2005 (EPA 2005) and the Energy Independence and Security Act of 2007 (EISA 2007).

1.2 OBJECTIVES

A. To maximize resource efficiency and reduce the environmental impacts of construction and operation, the Contractor during the construction phase of this project shall implement the following procedures:

1. Select products that minimize consumption of energy, water and non-renewable resources, while minimizing the amounts of pollution resulting from the production and employment of building technologies. It is the intent of this project to conform with EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:
   a. Include environmental considerations as part of the normal purchasing process.
   b. Emphasize pollution prevention early in the purchasing process.
   c. Examine multiple environmental attributes throughout a product's or service's life cycle.
   d. Compare relevant environmental impacts when selecting products and services.
   e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.
2. Control sources for potential Indoor Air Quality (IAQ) pollutants by controlled selection of materials and processes used in project construction in order to attain superior IAQ.
3. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in

proposing product substitutions and/or changes to specified processes.

4. Use building practices that insure construction debris and particulates do not contaminate or enter duct work prior to system startup and turn over.

1.3 RELATED DOCUMENTS

A. Section 01 74 19 CONSTRUCTION WASTE MANANGEMENT

1.4 DEFINITIONS

A. Agrifiber Products: Composite panel products derived from agricultural fiber

B. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials

C. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight

D. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that is was obtained from forests certified by a specified certification program

E. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder

F. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19.

G. Third Party Certification: Certification of levels of environmental achievement by nationally recognized sustainability rating system.

H. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky

I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock

J. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use

K. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 "Guidelines for the Use of Environmental Marketing Claims": www.ftc.gov/bcp/grnrule/guides980427

L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 250 miles (400 km) from the Project site

M. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured

N. Sealant: Any material that fills and seals gaps between other materials

O. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing.

P. Type 2 Finishes: "Fuzzy" materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gas.

Q. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

A. Sustainable Design Submittals:

1. Heat Island Effect:

a. Site Paving: Provide manufacturer's cut sheets for all impervious paving materials, highlighting the Solar Reflectance Index (SRI) of the material. Also, provide cut sheets for all pervious paving materials.

b. Roofing Materials: Submittals for roofing materials must include manufacturer's cut sheets or product data highlighting the Solar Reflectance Index (SRI) of the material.

2. Exterior Lighting Fixtures: Submittals must include cut sheets with manufacturer's data on initial fixture lumens above 90° from nadir for all exterior lighting fixtures, and, for parking lot lighting, verification that the fixtures are classified by the IESNA as "full cutoff" (FCO); OR provide documentation that exterior luminaires are IDA-Approved as Dark-Sky Friendly by the International Dark Sky Association (IDA) Fixture Seal of Approval Program.
3. Irrigation Systems: Provide manufacturer's cut sheets for all permanent landscape irrigation system components and for any rainwater harvesting system components, such as cisterns.
4. Water Conserving Fixtures: Submittals must include manufacturer's cut sheets for all water-consuming plumbing fixtures and fittings (toilets, urinals, faucets, showerheads, etc.) highlighting maximum flow rates and/or flush rates. Include cut sheets for any automatic faucet-control devices.
5. Process Water Use: Provide manufacturer's cut sheets for all water-consuming commercial equipment (clothes washers, dishwashers, ice machines, etc.), highlighting water consumption performance.
6. Elimination of CFCs AND HCFCs: Provide manufacturer's cut sheets for all cooling equipment with manufacturer's product data, highlighting refrigerants; provide manufacturer's cut sheets for all fire-suppression equipment, highlighting fire-suppression agents; provide manufacturer's cut-sheets for all polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation, highlighting the blowing agent(s).
7. Appliances and Equipment: Provide copies of manufacturer's product data for all Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), verifying compliance with EPA's Energy Star program.
8. Measurement and Verification Systems: Provide cut sheets and manufacturer's product data for all controls systems, highlighting electrical metering and trending capability components.

9. Salvaged or Reused Materials: Provide documentation that lists each salvaged or reused material, the source or vendor of the material, the purchase price, and the replacement cost if greater than the purchase price.
10. Recycled Content: Submittals for all materials with recycled content (excluding MEP systems equipment and components) must include the following documentation: Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product
    a. An electronic spreadsheet that tabulates the Project's total materials cost and combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value) expressed as a percentage of total materials cost. This spreadsheet shall be submitted every third month with the Contractor's Certificate and Application for Payment. It should indicate, on an ongoing basis, line items for each material, including cost, pre-consumer recycled content, post-consumer recycled content, and combined recycled content value.
11. Regional Materials: Submittals for all products or materials expected to contribute to the regional calculation (excluding MEP systems equipment and components) must include the following documentation:
    a. Cost of each material or product, excluding cost of labor and equipment for installation
    b. Location of product manufacture and distance from point of manufacture to the Project Site
    c. Location of point of extraction, harvest, or recovery for each raw material in each product and distance from the point of extraction, harvest, or recovery to the Project Site
    d. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of manufacture for each regional material
    e. Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the

Project Site to the point of extraction, harvest, or recovery for each regional material or product, including, at a minimum, gravel and fill, planting materials, concrete, masonry, and GWB

f. An electronic spreadsheet that tabulates the Project's total materials cost and regional materials value, expressed as a percentage of total materials cost. This spreadsheet shall be submitted every third month with the Contractor's Certificate and Application for Payment. It should indicate on an ongoing basis, line items for each material, including cost, location of manufacture, distance from manufacturing plant to the Project Site, location of raw material extraction, and distance from extraction point to the Project Site.

12. Outdoor Air Delivery Monitoring: Provide manufacturer's cut sheets highlighting the installed carbon dioxide monitoring system components and sequence of controls shop drawing documentation, including CO2 differential set-points and alarm capabilities.
13. Interior Adhesives and Sealants: Submittals for all field-applied adhesives and sealants, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.
    a. Provide manufacturers' documentation verifying all adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde.
14. Interior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content
15. Exterior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on ambient air quality, must include manufacturer's MSDSs or other manufacturer's Product Data highlighting VOC content.
16. Floor coverings:
    a. Carpet Systems: Submittals for all carpet must include the following:
        1) A copy of an assessment from the Building for Environmental and Economic Sustainability (BEES) software model, either

Version 3.0 or 4.0, with parameters of the model set as described by this specification section.

2) Manufacturer's product data verifying that all carpet systems meet or exceed the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.

17. Composite Wood and Agrifiber Binders: Submittals for all composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.
18. Entryway Systems: Provide manufacturer's cut sheets for all walk-off systems installed to capture particulates, including permanently installed grates, grilles, slotted systems, direct glue-down walk-off mats, and non-permanent roll-out mats.
19. Air Filtration: Provide manufacturer's cut sheets and product data highlighting the following:
    a. Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs) per ASHRAE HVAC Design Manual for Hospitals and Clinics.
    b. Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction. See above for requirements
20. Mercury in Lighting: Provide manufacturer's cut sheets or product data for all fluorescent or HID lamps highlighting mercury content.
21. Lighting Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all lighting controls systems components.
22. Thermal Comfort Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all thermal comfort-control systems components.
23. Blended Cement: It is the intent of this specification to reduce CO2 emissions and other environmentally detrimental effects resulting from the production of Portland cement by requiring that all concrete mixes, in aggregate, utilize blended cement mixes to displace portland cement as specified in Section 03 30 00, CONCRETE

typically included in conventional construction. Provide the following submittals:

a. Copies of concrete design mixes for all installed concrete
b. Copies of typical regional baseline concrete design mixes for all compressive strengths used on the Project
c. Quantities in cubic yards of each installed concrete mix

24. Gypsum Wall Board: Provide manufacturer's cut sheets or product data verifying that all gypsum wallboard products are moisture and mold-resistant.
25. Fiberglass Insulation: Provide manufacturer's cut sheets or product data verifying that fiberglass batt insulation contains no urea-formaldehyde.
26. Duct Acoustical Insulation: Provide manufacturer's cut sheets or product data verifying that mechanical sound insulation materials in air distribution ducts consists of an impervious, non-porous coatings that prevent dust from accumulating in the insulating materials.
27. Green Housekeeping: Provide documentation that all cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.

B. Project Materials Cost Data: Provide a spreadsheet in an electronic file indicating the total cost for the Project and the total cost of building materials used for the Project, as follows:

1. Not more than 60 days after the Preconstruction Meeting, the General Contractor shall provide to the Owner and Architect a preliminary schedule of materials costs for all materials used for the Project organized by specification section. Exclude labor costs and all mechanical, electrical, and plumbing (MEP) systems materials and labor costs. Include the following:

a. Identify each reused or salvaged material, its cost, and its replacement value.
b. Identify each recycled-content material, its post-consumer and pre-consumer recycled content as a percentage the product's weight, its cost, its combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value), and the total

combined recycled content value for all materials as a percentage of total materials costs.

c. Identify each regional material, its cost, its manufacturing location, the distance of this location from the Project site, the source location for each raw material component of the material, the distance of these extraction locations from the Project site, and the total value of regional materials as a percentage of total materials costs.

d. Identify each biobased material, its source, its cost, and the total value of biobased materials as a percentage of total materials costs. Also provide the total value of rapidly renewable materials (materials made from plants that are harvested in less than a 10-year cycle) as a percentage of total materials costs.

e. Identify each wood-based material, its cost, the total wood-based materials cost, each FSC Certified wood material, its cost, and the total value of Certified wood as a percentage of total wood-based materials costs.

2. Provide final versions of the above spreadsheets to the Owner and Architect not more than 14 days after Substantial Completion.

C. Construction Waste Management: See Section 01 74 19 "Construction Waste Management" for submittal requirements.

D. Construction Indoor Air Quality (IAQ) Management: Submittals must include the following:

1. Not more than 30 days after the Preconstruction Meeting, prepare and submit for the Architect and Owner's approval, an electronic copy of the draft Construction IAQ Management Plan in an electronic file including, but not limited to, descriptions of the following:

2. Instruction procedures for meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling

a. Instruction procedures for protecting absorptive materials stored on-site or installed from moisture damage

b. Schedule of submission to Architect of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil installed absorptive materials
c. Instruction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille
d. Instruction procedure for replacing all air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit

3. Not more than 30 days following receipt of the approved draft CIAQMP, submit an electronic copy of the approved CIAQMP in an electronic file, along with the following:
   a. Manufacturer’s cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for all filtration media to be installed at return air grilles during construction if permanently installed AHUs are used during construction.
   b. Manufacturer’s cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs).
4. Not more than 14 days after Substantial Completion provide the following:
   a. Documentation verifying required replacement of air filtration media in all air handling units (AHUs) after the completion of construction and prior to occupancy and, if applicable, required installation of filtration during construction.
   b. Minimum of 18 Construction photographs: Six photographs taken on three different occasions during construction of the SMACNA approaches employed, along with a brief description of each approach, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
   c. A copy of the report from testing and inspecting agency documenting the results of IAQ testing, demonstrating conformance with IAQ testing procedures and requirements.

E. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports for the following:

1. Construction Waste Management: Waste reduction progress reports and logs complying with the requirements of Section 01 74 19 "Construction Waste Management."
2. Construction IAQ Management: See details below under Section 3.2 Construction Indoor Air Quality Management for Construction IAQ management progress report requirements.

1.6 QUALITY ASSURANCE

A. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner, Architect, and all Subcontractors to discuss the Construction Waste Management Plan, the required Construction Indoor Air Quality (IAQ) Management Plan, and all other Sustainable Design Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Design Requirements and coordination of the Contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.

B. Construction Job Conferences: The status of compliance with the Sustainable Design Requirements of these specifications will be an agenda item at all regular job meetings conducted during the course of work at the site.

PART 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

A. Site Clearing: Topsoil shall be provided by the Contractor from on-site material which has been stockpiled for reuse. Off-site borrow should only be used when on-site sources are exhausted. Chip and/or compost on site all vegetated material identified for removal.

B. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of legally in accordance with Specifications Sections 01 74 19.

C. Roofing Materials: All roofing systems, other than vegetated roof systems, must comply with the following requirements:

1. Low-Sloped roofing less than or equal to 2:12 slope must have an SRI of at least 78.

2. Roofing Materials: Light-colored, reflective, and high-emissivity roofing helps to reduce localized heat build-up from roof surfaces that contribute to the urban heat island effect.

D. Exterior Lighting Fixtures:

1. All exterior luminaires must emit 0% of the total initial designed fixture lumens at an angle above 90° from nadir and/or meet the requirements of the Dark Sky certification program.
2. Exterior lighting cannot exceed 80% of the lighting power densities defined by ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.
3. No lighting of building facades or landscape features is permitted.

E. Herbicides and Pest Control: Herbicides shall not be permitted, and pest control measures shall utilize EPA-registered biopesticides only.

F. Landscape Irrigation: Use water-efficient landscape and irrigation strategies, including water reuse and recycling, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities).

G. Water-Conserving Fixtures: Plumbing fixtures and fittings shall use in aggregate at least 20% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements. Flow and flush rates shall not exceed the following:

1. Toilets: no more than 1.3 gallons per flush, otherwise be dual flush 1.6/0.8 gallons per flush, and have documented bowl evacuation capability per MaP testing of at least 400 grams
2. Urinals: Waterless or Water sense rated with no more than 0.5 gallons per flush.
3. Lavatory Faucets: 0.5 gpm with automatic faucet controls
4. Kitchen Sink Lavatories: 2.2 gpm
5. Showerheads: no more than 1.5gpm

H. Process Water Use: Employ strategies that in aggregate result in 20% less water use than the process water use baseline for the building after meeting the commercial equipment and HVAC performance requirements as listed in the Table below. For equipment not addressed by EPACT 2005 or the list below, additional equipment performance requirements may be proposed provided documentation supporting the proposed benchmark or industry standard is submitted.

1. Ice Machine: 20 gallons/100 pounds ice for machines making over 175 pounds of ice per day; 30 gallons/100 pounds ice for machines making less than 175 ice per day. Avoid water-cooled machines.

I. Elimination of CFCs AND HCFCs:

1. Ozone Protection and Greenhouse Gas Reduction: Base building cooling equipment shall contain no refrigerants other than the following: HCFC-123, HFC-134a, HFC-245fa, HFC-407c, or HFC 410a.
2. Fire suppression systems may not contain ozone-depleting substances such as halon 1301 and 1211.
3. Extruded polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation shall not be manufactured with hydrochlorofluorocarbon (HCFC) blowing agents.

J. Appliances and Equipment: All materials and equipment being installed that falls under the Energy Star or FEMP programs must be Energy Star or FEMP-rated. Eligible equipment includes refrigerators, motors, laundry equipment, office equipment and more. Refer to each program's website for a complete list.

K. HVAC Distribution Efficiency:

1. All duct systems shall be constructed of aluminum, stainless steel or galvanized sheet metal, as deemed appropriate based on the application requirements. No fiberglass duct board shall be permitted.
2. All medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the current SMACNA standards.
3. All ductwork shall be externally insulated. No interior duct liner shall be permitted.
4. Where possible, all air terminal connections shall be hard-connected with sheet metal ductwork. If flexible ductwork is used, no flexible duct extension shall be more than six feet in length.
5. All HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.
6. All supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch dampers, not at terminal face.

L. Measurement and Verification: Install controls and monitoring devices as required by MEP divisions order to comply with International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003, Option D.

1. The IPMVP provides guidance on situation-appropriate application of measurement and verification strategies.

M. Salvaged or Reused materials: There shall be no substitutions for specified salvaged and reused materials and products.

1. Salvaged materials: Use of salvaged materials reduces impacts of disposal and manufacturing of replacements.

N. Recycled Content of Materials:

1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 30% of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.
   a. e post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
   b. Do not include mechanical and electrical components in the calculations.
   c. Do not include labor and delivery costs in the calculations.
   d. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).
   e. Utilize all on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.
   f. The materials in the following list must contain the minimum recycled content indicated:

Category	**Minimum Recycled Content**
Compost/mulch	100% post-consumer
Cast-in-Place Concrete	6% pre-consumer
CMU: Gray Block	20% pre-consumer
Steel Reinforcing Bars	90% combined
Structural Steel Shapes	90% combined

Steel Joists	75% combined
Steel Deck	75% combined
Steel Fabrications	60% combined
Steel Studs	30% combined
Aluminum Fabrications	35% combined
Rigid Insulation	20% pre-consumer
Batt insulation	30% combined

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SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

A. Demolition and removal of roads, walks, curbs, and on-grade slabs outside buildings to be demolished: Section 31 20 00, EARTH MOVING.

B. Safety Requirements: GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

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

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

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

F. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.

G. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, 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 of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

D. 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.

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

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

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

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

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

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

1.4 UTILITY SERVICES:

A. Demolish and remove outside utility service lines shown to be removed.

B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DEMOLITION:

A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
   1. As required for installation of new utility service lines.
   2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.

B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Project Manager. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

C. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 5 feet below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 5 feet, or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.

D. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Project Manager. When Utility lines are encountered that are not indicated on the drawings, the Project Manager shall be notified prior to further work in that area.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Project Manager. 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 13.41
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SECTION 02 82 13.41

ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS

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, Asbestos Abatement, Demolition, Accident Prevention (FAR 52.236-13) and other Division 01, GENERAL REQUIREMENTS specifications, shall apply to the work of this section. Prevailing wage requirements pursuant to the Davis-Bacon Act shall apply to this work. 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, coordination with other work and the phasing of the work. In the event the 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 Abatement Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Abatement Contractor.

1.1.2 EXTENT OF WORK

A. This work will be asbestos abatement prior to the total demolition of the facility as indicated by the scope of work. RACM discovered during total demolition is also within the scope of this specification. The extent of the abatement is for informational purposes only and is based on the best information available at the time of the specification preparation. The Abatement Contractor shall satisfy themselves as to the extent of the work. 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 regulated asbestos containing materials (RACM) and asbestos contaminated elements shall be conducted in approved regulated areas in all areas prior to the beginning of demolition. Any RACM discovered during demolition activity shall be cause for stopping the work. The Demolition Contractor's personnel shall attend an on-site training session related to the types of asbestos at the site and shall not disturb the ACM if found during their work.
No abatement work shall begin in any area unless the Abatement Contractor and Project Manager agreed that all asbestos work requirements as stipulated in the specification have been met. Attachment #4 must be filled out for each abatement area.

1.1.3 RELATED WORK

A. Section 02 82 13.41, ASBESTOS ABATEMENT FOR TOTAL DEMOLITION PROJECTS.

1.1.4 TASKS

The work tasks are summarized briefly as follows:

A. Asbestos abatement of RACM as required by EPA NESHAP prior to demolition. An EPA/State certified Project Designer must provide a site-specific specification for the asbestos abatement.
B. Asbestos abatement and clean-up of the asbestos containing debris as indicated in the scope of work. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparation/isolation, accident prevention, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.
C. Demolition activities including demolition, clean-up and disposal of building materials, record keeping, security, monitoring, and inspections conducted in accordance with all applicable laws and this specification. A Demolition Plan, developed by a Professional Engineer, meeting the requirements of 29 CFR 1926.850(a) must be provided.

1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES

A. The Contractor and Contractor's personnel shall cooperate fully with the Project Manager to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved VA Design and Construction Procedure. VA Design and Construction Procedure 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 STOP ABATEMENT ORDER

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

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

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

1.3 DEFINITIONS

1.3.1 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.

1.3.2 GLOSSARY:

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

Aerosol - Solid or liquid particulate suspended in air.

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

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

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

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

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

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

Air sample filter - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

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

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

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

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

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

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

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

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

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

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

Authorized visitor - Any person approved by the VA; the contractor; or any government agency representative having jurisdiction over the regulated area (e.g., OSHA, Federal and State EPA0.

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 – Plastic barriers placed over critical barriers and exposed directly to abatement work.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Disturbance - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag 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 sift-proof, dustproof, and leak-tight.

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

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

Encapsulation - Treating ACM with an encapsulant.

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

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

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

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

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

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

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

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

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

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

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

HVAC - Heating, Ventilation and Air Conditioning

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

Industrial hygienist technician (IH Technician) - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned. Some states require that an industrial hygienist technician

conducting asbestos abatement clearance inspection and clearance air sampling be licensed as an asbestos project monitor.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Positive/negative fit check - A method of verifying the seal of a facepiece respirator by temporarily occluding the filters and breathing in (inhaling) and then temporarily occluding the exhalation valve and breathing out (exhaling) while checking for inward or outward leakage of the respirator respectively.

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

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

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

Project Manager - The VA official responsible for on-going project work.

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

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

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

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

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

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

Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.
Repair - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.
Shower room - The portion of the PDF where personnel shower before leaving the regulated area.
Supplied air respirator (SAR) - A respiratory protection system that supplies minimum Grade D respirable air per ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.
Surfacing ACM - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.
Surfactant - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.
Thermal system ACM - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.
Transmission electron microscopy (TEM) - A microscopy method that can identify and count asbestos fibers.
VA Professional Industrial Hygienist (VPIH/CIH) – The Department of Veterans Affairs Professional Industrial Hygienist must meet the qualifications of a PIH, and may be a Certified Industrial Hygienist (CIH).
Visible emissions - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM/ACS or ACM waste material.
Waste/Equipment decontamination facility (W/EDF) – The area in which equipment is decontaminated before removal from the regulated area.
Waste generator - Any owner or operator whose act or process produces asbestos-containing waste material.
Waste shipment record - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.
Wet cleaning - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

1.3.3 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. CFR Code of Federal Regulations
Government Printing Office
Washington, DC 20420

C. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460
202-382-3949

D. MIL-STD Military Standards/Standardization Division
Office of the Assistant Secretary of Defense
Washington, DC 20420

E. NEC National Electrical Code (by NFPA)

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

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

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

I. DOT Department of Transportation
Washington, DC 20590

1.4 APPLICABLE CODES AND REGULATIONS

1.4.1 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 Abatement Contractor's office area/clean room.

1.4.2 ABATEMENT CONTRACTOR RESPONSIBILITY:

The Asbestos Abatement Contractor (Contractor) shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the asbestos abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection including respirator fit testing, as required by applicable Federal, State and Local regulations. The Contractor shall hold the VA and VPIH/CIH consultants harmless for any Contractor’s failure to comply with any applicable work, packaging, transporting,

disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The Contractor will incur all costs of the CPIH/CIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements related to failure to comply with the regulations applicable to the work.

1.4.3 FEDERAL REQUIREMENTS:

Federal requirements which govern various aspects of asbestos abatement include, but are not limited to, the following regulations:

A. Occupational Safety and Health Administration **(OSHA)**
   1. Title 29 CFR 1926 - Construction Standard Requirements - Demolition Work
   2. Title 29 CFR 1910.38(a);(b) - Emergency Action Plan
   3. Title 29 CFR 1910.132 - Personal Protective Equipment
   4. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
   5. Title 29 CFR 1910.1200 - Hazard Communication
   6. Title 29 CFR 1910.151 - Medical and First Aid
B. Environmental Protection Agency (EPA)
   1. Title 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
   2. Title 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA).

1.4.4 STATE REQUIREMENTS:

A. The asbestos survey has been conducted by a State of Iowa licensed asbestos building inspector in accordance with Environmental Protection Agency (EPA) regulations under 40 Code of Federal Regulations (CFR) 61, Subpart M, National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAP prohibits the release of asbestos fibers to the atmosphere during renovation or demolition activities.

B. All facility demolitions require submission of a two-page demolition notification form to the Iowa Department of Natural Resources' (IDNR) Air Quality Bureau, regardless of whether regulated asbestos containing materials are identified. A facility renovation requires notification if the combined RACM meets or exceeds any of the following thresholds:
   a. 160 square feet (ft2) of surfacing RACM,
   b. 260 linear feet of piping or thermal system insulation, or
   c. 35 cubic feet (ft3) of asbestos-containing debris..

C. All asbestos Contractors shall be licensed by the State of Iowa through the Iowa Division of Labor Services.

1.4.5 LOCAL REQUIREMENTS:

NOT USED

1.4.6 PERMITS/LICENSES:

NOT USED

1.4.7 POSTING AND FILING OF REGULATIONS:

Maintain one (1) copy of all applicable federal regulations. The regulations will be kept in the Abatement Contractor's office for access. If required, the Contractor shall comply with all applicable State licensing requirements.

1.4.8 VA RESPONSIBILITIES:

Prior to commencement of work:

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

1.4.9 SITE SECURITY

A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately require any unauthorized person to leave the regulated area and then notify the VA Contracting Officer or VA Representative using the most expeditious means.
C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall <u>not</u> be locked from the inside; however, they shall be sealed with poly sheeting and taped until needed. In any situation where exposure to high temperatures which may result in a flame hazard, fire retardant poly sheeting must be used.
E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect

adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.

F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.

G. The regulated area shall be locked during non-working hours and secured by VA Representative or Competent Person. The VA Police should be informed of asbestos abatement regulated areas to provide security checks during facility rounds and emergency response.

1.4.10 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.

1.4.11 ACCIDENT PREVENTION

A. The Abatement Contractor shall provide and maintain a work environment and procedures which will safeguard the public and VA staff personnel, property, materials, supplies, and equipment which may be adjacent to the Abatement Contractor's regulated areas. The Abatement Contractor will avoid interruptions of VA operations so the project will be completed on schedule.
B. While performing abatement activities, the Abatement Contractor shall provide all/any required safety barricades, signs, and signal lights. The Abatement Contractor shall comply with all applicable standards related to abatement operations as mandated by OSHA/EPA/State Standards. The Abatement Contractor shall provide a copy of and comply with the pertinent provisions of the latest version of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.
C. Whenever the Project Manager (PM) becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or VA patients/personnel, the PM shall notify the Abatement Contractor's Competent Person orally, with written confirmation and request immediate corrective action(s) be taken to abate the noncompliant condition. This notice, when delivered to the Abatement Contractor or the Contractor's representative, shall be deemed sufficient notice of noncompliance and that corrective action is required. The Abatement Contractor shall take corrective action immediately upon receipt of the oral/written notice.
   If the Abatement Contractor fails or refuse to promptly take corrective action, the PM has the option to issue an order to stop all or part of the work until correction actions have been taken. The Abatement Contractor shall have no entitlement to any equitable adjustment of the contract price or extension of the performance schedule based on any stop work order issued under this clause.
D. The Abatement Contractor shall include the provisions of 1.4.11 in any subcontractor agreement.
E. The Abatement Contractor shall submit a written plan for implementing 1.4.11. The plan shall include an analysis of any significant hazards to life, limb, and property inherent to abatement work and a plan for controlling these hazards.
F. The Project Manager or other designated VA employee, shall serve as the Safety Officer and has authority to enforce the Accident Prevention requirements.

1.4.12 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.

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 Asbestos Hazard Abatement Plan. In these procedures, the following information must be detailed, specific for this project.
   1. Regulated area preparation procedures;
   2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
   3. Decontamination area set-up/layout and decontamination procedures for employees;
   4. Abatement methods/procedures and equipment to be used; and
   5. Personal protective equipment to be used.
H. At this meeting the Contractor shall provide all submittals as required.
I. Procedures for handling, packaging and disposal of asbestos waste.
J. Emergency Action Plan and Contingency Plan Procedures.

1.5 ABATEMENT PROJECT COORDINATION

Following are the minimum personnel necessary for coordination of the abatement work.

1.5.1 PERSONNEL

A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; social security number; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
C. Minimum qualifications for Contractor and assigned personnel are:
   1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of federal (and state as applicable) EPA and OSHA asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance

for asbestos work as required by the state; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive 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 within the past three (3) years; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
3. The Contractor Professional Industrial Hygienist/CIH (CPIH/CIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete 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 or equivalent, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience within the past three (3) years of similar size and complexity; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

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

1.6 WORKER PROTECTION

1.6.1 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. The OSHA Construction Safety 10 Hour course shall be required for all on-site contractors' personnel.

1.6.2 PERSONAL PROTECTIVE EQUIPMENT

Provide, at a minimum, steel toe boots, hard hats, safety glasses, protective clothing, respiratory protection and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). A copy of the hazard

assessment shall be provided to the VPIH. The Competent Person and CPIH shall ensure the provision of and the integrity of personal protective equipment worn for the duration of the project.

1.7 RESPIRATORY PROTECTION

1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM

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

1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR

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

1.7.3 SELECTION AND USE OF RESPIRATORS

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

1.7.4 MINIMUM RESPIRATORY PROTECTION

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

1.7.5 MEDICAL WRITTEN OPINION

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

1.7.6 RESPIRATOR FIT TEST

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

1.7.7 RESPIRATOR FIT CHECK

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

1.7.8 MAINTENANCE AND CARE OF RESPIRATORS:

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

1.7.9 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". The competent person on site will be responsible for the supplied air system to ensure the safety of the worker.

1.8 WORKER PROTECTION

1.8.1 MEDICAL EXAMINATIONS

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

1.8.2 PROTECTIVE CLOTHING

Provide boots, booties, hard hats, goggles, clothing, respirators and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). Provide all personnel entering the regulated area with disposable full body coveralls, disposable head covering, and 18 inch boot coverings. The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Provide plastic/rubber disposable gloves for hand protection. Cloth type gloves may be worn under plastic/rubber gloves, but cannot be used alone. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle. Worker protection shall meet the most stringent requirement.

1.8.3 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.

1.8.4 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 disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid inhaling asbestos fibers wile 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.

1.8.5 REGULATED AREA REQUIREMENTS

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

1.9 DECONTAMINATION FACILITIES

1.9.1 DESCRIPTION

Provide each regulated area with separate personnel (PDF) and equipment/waste decontamination facilities (EWDF). 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 EWDF. Separate shower facilities must be provided for males/females as per OSHA requirements. See drawings for minimum requirements of each and OSHA 29 CFR 1926.1101, Appendix F.

1.9.2 GENERAL REQUIREMENTS

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

1.9.3 TEMPORARY FACILITIES TO THE PDF AND EWDF

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

1.9.3 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.

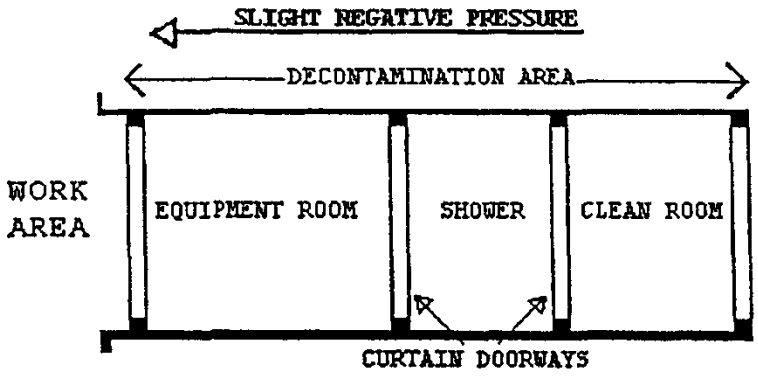
1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel

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, minimum 10 pounds capacity, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.

2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of 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 be as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF shall be a minimum of 2 layers of 6 mil opaque fire retardant poly.



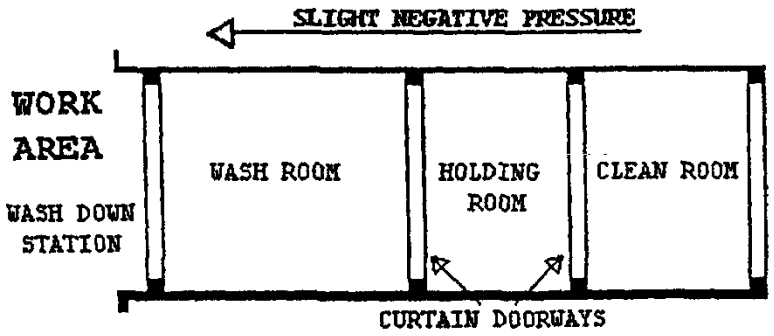
1.9.5 EQUIPMENT/WASTE DECONTAMINATION FACILITY (EWDF)

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

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment bag and container cleaning station.
2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding

room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.

5. The W/EDF shall be as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



1.9.6 EQUIPMENT/WASTE DECONTAMINATION PROCEDURES:

At the wash down 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 wash down station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT

2.1 MATERIALS AND EQUIPMENT

2.21.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)

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

A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).

B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable and combustible materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized location.
D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
E. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mil, unless otherwise specified by the VA or more stringent State requirement(s). For floors and all other uses, sheeting of at least 6-mil shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.
I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.
J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).
K. Disposal bags – 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
L. The VA shall be provided an advance copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-project submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover or other product. Appropriate encapsulant(s) shall be provided.
M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a written hazard assessment conducted under 29 CFR 1910.132(d).

2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM

The Contractor shall provide enough HEPA negative air machines to continuously maintain a pressure differential of -0.02" water column gauge. The Competent Person shall determine the number of units needed for the regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the cubic feet per minute (CFM) for each unit to determine the number of units needed to continuously maintain a pressure differential of -0.02” WCG. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area. NIOSH has done extensive studies and has determined that negative air machines typically operate at ~50% efficiency. The contractor shall consider this in their determination of number of units needed to continuously maintain a pressure differential of -0.02" water column gauge. The contractor shall use 8 air changes per hour or double the number of machines, based on their calculations, or submit proof their machines operate at stated capacities, at a 2" pressure drop across the filters.

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%. 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 □m 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 negative air machine 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 provided 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 Underwriters Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

H. It is essential that replacement HEPA filters be tested using an "in-line" testing method, to ensure the seal around the periphery was not damaged during replacement. Damage to the outer HEPA filter seal could allow contaminated air to bypass the HEPA filter and be discharged to an inappropriate location. Contractor will provide written documentation of test results for negative air machine units with HEPA filters changed by the contractor or documentation when changed and tested by the contractor filters.

2.1.5 PRESSURE DIFFERENTIAL

The fully operational negative air system within the regulated area shall continuously maintain a 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 of the general power grid and the VAMC emergency power grid, 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. Verification and documentation of adequate negative pressure differential across each barrier must 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 the 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 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been successfully completed.
No negative air units shall be shut down at any time unless authorized by the VA Contracting Officer, verbally and 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 successfully 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 unit exterior surfaces shall have been completely decontaminated; pre-filters are not to be removed and the units inlet/outlet sealed with 2 layers of 6 mil poly immediately after shut down. No filter removal shall occur at the VA site following successful completion of site clearance. OSHA/EPA/DOT asbestos shall be attached to the units.

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 as a result of the work, shall 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 Section 2.2.8; 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 duct 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 to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid and capable of withstanding the negative pressure.

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 and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area. Heat must be shut off any objects covered with poly.

2.2.5 PRIMARY BARRIERS

A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil, fire retardant poly on the 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 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 duct tape and glue all wall layers.
B. Elevator doors must be covered with 2 layers of 6 mil fire retardant poly. The elevator door must be in a positively pressurized area outside the clean room of the PDF.
C. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads held in place with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

2.2.6 SECONDARY BARRIERS

A loose layer of 6 mil poly 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 and at a minimum 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, conduits, etc. must be firestopped with a fire-rated firestop system providing an air tight seal.

B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.
C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed

2.3 MONITORING, INSPECTION AND TESTING

2.3.1 GENERAL

A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. OSHA requires that the Employee exposure to asbestos must not exceed 0.1 fibers per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. The CPIH/CIH is responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH/CIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
B. The VA 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 the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An

agreement between the CPIH/CIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

2.3.2 SCOPE OF SERVICES OF THE VPIH CONSULTANT

A. The purpose of the work of the VPIH/CIH is to: assure quality; adherence to the specification; resolve problems; prevent the spread of contamination beyond the regulated area; and assure clearance at the end of the project. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
   1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
   2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
   3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
   4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of conflicts, interpret data, etc.
   5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to certify compliance with all regulations and VA requirements/specifications.
   6. Task 6: Issue certificate of decontamination for each regulated area and project report.

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..
D. All air sampling and analysis data will be recorded on VA Form 10-0018.

2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH/CIH

The Contractor’s CPIH/CIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH/CIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor’s personnel. Safety and health conditions and the

provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in sampling and analysis. The IH Technician shall have successfully completed a NIOSH 582 Course or equivalent and provide documentation. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA AHERA/State Contractor/Supervisor or Abatement Worker and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation on substantially similar projects in size and scope. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT and approved by the VA prior to start of the project. A daily log, shall be maintained by the CPIH/CIH or IH Technician, documenting all OSHA requirements for air personal monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH upon request. The log will contain, at a minimum, information on personnel or area samples, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH/CIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH/CIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH/CIH responsibilities. Additionally, the CPIH/CIH will monitor and record pressure readings within the containment daily with a minimum of two readings at the beginning and at the end of a shift, and submit the data in the daily report.

2.4 ASBESTOS HAZARD ABATEMENT PLAN

The Contractor shall have established Asbestos Hazard Abatement Plan (AHAP) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the procedures to be followed during all phases of the work by the Contractor's personnel. The AHAP must be modified as needed to address specific requirements of this project and the specifications. The AHAP(s) shall be submitted for review and approval to the VA prior to the start of any abatement work. The minimum topics and areas to be covered by the AHAP(s) are:

A. Minimum Personnel Qualifications.
B. Contingency Plans and Arrangements.
C. Security and Safety Procedures.
D. Respiratory Protection/Personal Protective Equipment Program and Training.

E. Medical Surveillance Program and Recordkeeping.
F. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area.
G. Decontamination Facilities and Entry/Exit Procedures (PDF and EWDF).
H. Negative Pressure Systems Requirements.
I. Monitoring, Inspections, and Testing.
J. Removal Procedures for RACM and ACE.
K. Removal Procedures for RACM discovered during building demolition shall be provided as per NESHAP.
L. Removal of Contaminated Soil (if applicable).
M. Abatement of crawlspaces and/or pipe tunnels if they exist within the facility.
N. Disposal of RACM and ACE as per NESHAP; OSHA; and DOT for friable asbestos including NESHAP/DOT shipping papers example. Disposal requirements for non-friable waste, as per OSHA requirements.
O. Regulated Area Decontamination/Clean-up.
P. Regulated Area Visual and Air Clearance, if required.
Q. Project Completion/Closeout.

2.5 SUBMITTALS

2.5.1 PRE-CONSTRUCTION MEETING SUBMITTALS

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project:

A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
C. Submit Asbestos Hazard Abatement Plan developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH/CIH.
D. Submit the specifics of the materials and equipment to be used for this project with manufacturer names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
   1. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
   2. Waste water filtration system, shower system, containment barriers.
   3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, and fire extinguishers.
   4. Respirators, protective clothing, personal protective equipment.
   5. Fire safety equipment to be used in the regulated area.
E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Personal air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A. And area or clearance air monitoring in accordance with EPA AHERA protocols.
H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
   1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; 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 (e.g., OSHA), notices of violations (e.g., Federal and state EPA), penalties, and legal actions taken against the company including and of the company's officers (including damages paid) in the last 3 years. Provide copies and all information needed for verification.
I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH/CIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
   1. CPIH/CIH and IH Technician: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of AHAP(s) developed; medical opinion; and current respirator fit test.
   2. Competent Person(s)/Supervisor(s): Number; names; social security numbers; years of abatement experience as Competent Person/Supervisor; list of similar projects in size/complexity as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
   3. Workers: Numbers; names; social security numbers; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion (asbestos surveillance and respirator use); and current respirator fit test.
J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating

in plain language the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; a list of references of independent laboratories/IHs familiar with your air monitoring and AHAP(s); and copies of monitoring results of the five referenced projects listed and analytical method(s) used.

K. Rented equipment must be decontaminated prior to returning to the rental agency.

L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants, all MSDS and application instructions.

2.5.2 SUBMITTALS DURING ABATEMENT

A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.

B. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work:
   1. Inspection and approval of the regulated area preparation prior to start of work and periodic during work.
   2. Removal of any poly barriers.
   3. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
   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 Project Manager on a weekly basis.

2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT

The CPIH/CIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. It will also include information on the containment and transportation of waste from the containment with applicable Chain of Custody forms. The report shall include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with Attachment #1. All clearance and perimeter area samples must be submitted. The VA Representative will retain the abatement report after completion of the project and provide copies of the abatement report to VAMC Office of Engineer and the Safety Office.

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/CIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH/CIH, Competent Person(s), Project Manager, 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 Project Manager regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the Project Manager 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

A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
B. Upon completion of all preparatory work, the CPIH/CIH will inspect the work and systems and will notify the Project Manager when the work is completed in accordance with this specification. The Project Manager may inspect the regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved AHAP, 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/CIH shall document the pre-abatement activities described above and deliver a copy to the Project Manager.
D. Upon satisfactory inspection of the installation of and operation of systems the Project Manager will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification and all applicable regulations.

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 Project Manager when the work is completed in accordance with this specification. The Project Manager may inspect the regulated area and the systems with the VPIH and may require that upon satisfactory inspection, the abatement contractor's employees perform all major aspects of the approved AHAP, 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/CIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
D. Upon satisfactory inspection of the installation of and operation of systems the Project Manager will notify the abatement contractor in writing to proceed with the asbestos abatement work in accordance with this specification.

3.2 REGULATED AREA PREPARATIONS

A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed the PEL. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
B. Shut down and lock out/tag out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
C. Shut down and lock out/tag out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil 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 the shower(s) shall be supplied with backflow prevention. The Contractor shall be responsible for hot water provision to the shower(s).
F. The Contractor shall not allow unauthorized persons into the regulated area without the written permission of the VPIH.

3.3 CONTAINMENT COVERINGS FOR THE REGULATED AREA

3.3.1 GENERAL

Seal off the perimeter of the regulated area to completely isolate the abatement project 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 abatement 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 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 through the PDF. All other means of access shall be closed off by proper sealing and DANGER 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 at least 4 mil poly 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 nominal 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 1/2" (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 and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed. Light fixtures shall not be operational during abatement. Auxiliary lighting shall be provided. If needed, provide plywood squares 6" x 6" x 3/8" (150mm x 150mm x 18mm) held in place with one 6d smooth masonry/galvanized nail driven through the center of the plywood square and duct tape on the poly so as to clamp the poly to the wall/surface. Locate plywood squares at each end, corner, and 4' (1200mm) maximum on centers.

3.3.5 PRIMARY/SECONDARY BARRIERS

A. Floors: Cover the floor of the regulated area with at least two layers of 6 mil, fire retardant poly, turning up the walls at least 12" (300mm). The poly must form a right angle at the floor-wall juncture so there is no radius which can be stepped on, possibly causing detachment of the poly. Spray glue and duct tape must both be used for floor seams. Floor seams must overlap a minimum of 6 feet (1800mm) or be at right angles to each other. The top sheet of poly must be able to be removed independently of the bottom layer. A third loose layer of 6 mil poly shall be used in the area of removal and periodically picked up to reduce contamination of the initial layers.
B. Walls: All walls in the regulated area, including critical barriers, shall be covered with 2 layers of 4 mil fire retardant poly, mechanically supported and sealed with duct tape and/or spray glue. Tape all joints, including the floor-wall joint, with duct tape/spray glue. All wall joints must overlap at least 6 feet (1800mm).

NOTE: The VA or State requirements may require the use of 6 mil poly.

C. Stairs and Ramps: Stairs or ramps covered in poly must be provided with 3/4" (36mm) exterior grade plywood treads securely held in place over the poly. Do not cover stairs or ramps with unsecured poly. Do not cover rungs or rails with any protective materials.

3.3.6 EXTENSION OF THE REGULATED AREA

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels.

3.4 REMOVAL OF RACM AND ACE

3.4.1 WETTING MATERIALS

A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP regulation for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.

B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.

3.4.2 WET REMOVAL OF ACM OTHER THAN AMOSITE

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 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 the bag neck tightly, bend over (gooseneck) and seal with a minimum of three tight wraps of duct tape. Clean /decontaminate the outside of the bag 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 (6 meters), 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. Periodically re-wet the substrate with amended water as needed to prevent drying of the material before the residue is removed from the substrate.
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.

3.4.3 WET REMOVAL OF AMOSITE

A. Project may involve removal of amosite where areas indicate locations of amosite ACM which will require local exhaust ventilation and collection as described below, in addition to wet removal. Provide specific description. Refer to the Study as provided by the VA.
B. Provide local exhaust ventilation and collection systems to assure collection of amosite fibers at the point of generation. A 300 mm (12") flexible rigid non-collapsing duct shall be shall be located no more than 600 mm (2') from any scraping/brushing activity. Primary filters must be replaced every 30 minutes on the negative air machines. Each scraping/brushing activity must have a negative air machine devoted to it. For pre-molded pipe insulation or cutting wire lathe attach a 1200 mm (4') square flared end piece on the intake of the duct. Support the duct horizontally at a point 600 mm (2') below the work to effect

capture. One person in the crew shall be assigned to operate the duct collection system on a continual basis.

C. Amosite does not wet well with amended water. Submit full information/documentation on the wetting agent proposed prior to start for review and approval by the Project Manager. Insure that the material is worked on in small sections and is thoroughly and continuously wetted. Package as soon as possible while wet. Remove as required.

3.4.4 REMOVAL OF RACM CONTAMINATED SOIL AND OTHER SPECIAL PROCEDURES:

NOT USED.

3.4.5 GLOVEBAG REMOVAL PROCEDURES

GENERAL: All applicable OSHA requirements and the VA 01570 Specification for glovebag removal shall be followed. The Contractor's AHAP for glovebag removal shall minimally meet the above requirements.

3.5 DISPOSAL OF RACM AND ACE WASTE MATERIALS

3.5.1 GENERAL

The VA must be notified at least 24 hours in advance of any waste removed from the containment. Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Transport will be in compliance with 49 CFR 100-185 regulations. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

3.5.2 PROCEDURES

A. 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 be securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goose necked 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 signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.

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.

D. The VA will be notified of any waste removed from the containment prior to 24 hours.

3.6 PROJECT DECONTAMINATION

3.6.1 GENERAL

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

3.6.2 REGULATED AREA CLEARANCE

Air testing and other requirements which must be met before release of the Abatement Contractor are specified in Final Testing Procedures.

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 EWDF facilities, and negative pressure systems.

3.6.4 PRE-DECONTAMINATION CONDITIONS

A. Before decontamination starts, all ACM and ACE from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removed and disposed of along with any gross debris generated by the work.
B. At the start of decontamination, the following shall be in place:
   1. Primary barriers consisting of two layers of 6 mil poly on the floor and on the walls.
   2. Critical barriers 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.
   3. Critical barrier poly over lighting fixtures, clocks, HVAC openings, doorways, windows, convectors, speakers and other openings in the regulated area.
   4. Decontamination facilities for personnel and equipment in operating condition and the negative pressure system in operation.

3.6.5 CLEANING

Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping/air blowing methods. Use each surface of a wetted cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. Remove all filters in the air handling system and dispose of as ACM waste in accordance with these specifications. The negative pressure system shall remain in operation during this time. Additional cleaning(s) may be needed as determined by the CPIH/VPIH/CIH..

3.7 VISUAL INSPECTION AND AIR CLEARANCE TESTING

3.7.1 GENERAL

Notify the VA representative 24 hours in advance for the performance of the visual inspection and air clearance testing, if required. The

visual inspection and air clearance testing, if needed, will be performed by the VPIH after the CPIH has performed final air clearance testing, if needed.

3.7.2 VISUAL INSPECTION

The CPIH/CIH and VPIH/CIH will perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH/CIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the Project Manager of the results with a brief report from the CPIH/CIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

3.7.3 AIR CLEARANCE TESTING

A. Since the areas will not be re-occupied by personnel after the completion of the abatement, air clearance testing is not required under OSHA/EPA AHERA. States may have rules for clearance testing that might require testing. Consult State rules for the facility and perform clearance testing if needed. After an acceptable visual inspection by the VPIH and Project Manager, the VPIH will perform the final testing. If the release criteria are not met, the Abatement Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Abatement Contractor.
B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

3.7.4 AIR CLEARANCE PROCEDURES

A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc, as measured by PCM methods, if required.
B. Final Clearance Sampling: If required, the VPIH will secure samples and analyze them according to the NIOSH 7400 method. Samples must be confirmed at an AIHA accredited laboratory if samples are analyzed on-site.

3.7.5 CLEARANCE SAMPLING USING PCM

A. If required, and after the CPIH/CIH has provided clearance monitoring, the VPIH will perform background, adjacent area, and regulated area samples during construction, and clearance samples as directed by the VA Representative.
B. The NIOSH 7400 method will be used for clearance sampling with a minimum collection volume based on a fiber density of 100 to 1300 fibers/sq.mm, (0.79 - 10.2 fibers/field) and a minimum detection limit of 0.005 f/cc or less.

3.8 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE

3.8.1 COMPLETION OF ABATEMENT WORK

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area. Complete asbestos abatement work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

A. Remove all equipment 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.

3.8.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

The CPIH/CIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

3.8.3 WORK SHIFTS

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday -Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

ATTACHMENT #1

CERTIFICATE OF COMPLETION

DATE: _____ VA Project #:_____

PROJECT NAME:_____Abatement Contractor:_____

VAMC/ADDRESS:_____

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):

   which took place from / / to / /

2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Abatement Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.
7. That all abatement work was done in accordance with OSHA requirements and the manufacturer’s recommendations.

CPIH/CIH Signature/Date:.....

CPIH/CIH Print Name:.....

Abatement Contractor Signature/Date:.....

Abatement Contractor Print Name:.....

ATTACHMENT #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/CIH:_____Date:_____

Printed Name of CPIH/CIH: _____

Signature of Contractor:_____Date:_____

Printed Name of Contractor:_____

ATTACHMENT #4

ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S ASBESTOS SPECIFICATIONS

VA Project Location:_____

VA Project #:_____

VA Project Description:_____

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature_____Date_____

Abatement Contractor Competent Person(s)_____Date_____

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SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

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

1.2 RELATED WORK:

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

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

B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.

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 inch and -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 inch and -1/2 inch where gross bar length is less than 12 feet, or +0 inch and -3/4 inch where gross bar length is 12 feet or more.

C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +3/4 inch and -1/4 inch. Tolerance of thickness of beams more than 12 inch but less than 3 feet is +3/4 inch and -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 2 feet of construction joints and vertical elements that project through slab surface.

2. Maximum elevation change which may occur within 2 feet of any column or wall element is 0.25 inches.
3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 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. Air-entraining admixture.
   2. Chemical admixtures, including chloride ion content.
   3. Liquid membrane-forming compounds for curing concrete.
   4. Non-shrinking grout.
   5. Liquid hardener.
   6. Waterstops.
   7. Expansion joint filler.
   8. 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.
F. Test Report for Concrete Mix Designs: Trial mixes including water-cement fly ash ratio curves, concrete mix ingredients, and admixtures.
G. Shoring and Reshoring Sequence: Submit for approval a shoring and reshoring sequence, prepared by a registered Professional Engineer. As a minimum, include timing of form stripping, reshoring, number of floors to be re-shored and timing of re-shore removal to serve as an initial outline of procedures subject to modification as construction progresses. Submit revisions to sequence, whether initiated by Project Manager (see FORMWORK) or Contractor.

1.7 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; Project Manager; Consulting Engineer; Contractor 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.

1.8 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 Concrete Institute (ACI):

117-10.....Specifications for Tolerances for Concrete Construction and Materials and Commentary
211.1-91(R2009).....Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
214R-11.....Guide to Evaluation of Strength Test Results of Concrete
301-10.....Standard Practice for Structural Concrete
304R-00(R2009).....Guide for Measuring, Mixing, Transporting, and Placing Concrete
305.1-06.....Specification for Hot Weather Concreting
306.1-90(R2002).....Standard Specification for Cold Weather Concreting
308.1-11.....Specification for Curing Concrete

309R-05.....Guide for Consolidation of Concrete
318-11.....Building Code Requirements for Structural Concrete and Commentary
347-04.....Guide to Formwork for Concrete
SP-66-04.....ACI Detailing Manual

C. American National Standards Institute and American Hardboard Association (ANSI/AHA):
A135.4-2004.....Basic Hardboard

D. American Society for Testing and Materials (ASTM):
A82/A82M-07.....Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
A185/185M-07.....Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
A615/A615M-09.....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
A653/A653M-11.....Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process
A996/A996M-09.....Standard Specification for Rail Steel and Axle Steel Deformed Bars for Concrete Reinforcement
C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the field
C33/C33M-11A.....Standard Specification for Concrete Aggregates
C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C94/C94M-12.....Standard Specification for Ready Mixed Concrete
C143/C143M-10.....Standard Test Method for Slump of Hydraulic Cement Concrete
C150-11.....Standard Specification for Portland Cement
C171-07.....Standard Specification for Sheet Materials for Curing Concrete
C172-10.....Standard Practice for Sampling Freshly Mixed Concrete
C173-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192/C192M-07.....Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
C231-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

E. American Welding Society (AWS):

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

F. Concrete Reinforcing Steel Institute (CRSI):

Handbook 2008

G. U. S. Department of Commerce Product Standard (PS):
PS 1.....Construction and Industrial Plywood
PS 20.....American Softwood Lumber

H. 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) 5/8 inch, or 3/4 inch thick for unlined contact form. B-B High Density Concrete Form Overlay optional.

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

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

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 3/4 inch diameter, or a depression in exposed concrete surface, or leave metal closer than 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 12 inches thick.
2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.

3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.

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

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

F. Admixtures:

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

G. Vapor Barrier: ASTM D4397, 15 mil.

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

I. Welded Wire Fabric: ASTM A185.

J. Reinforcing Bars to be Welded: ASTM A706.

K. Galvanized Reinforcing Bars: ASTM A767.

L. Cold Drawn Steel Wire: ASTM A82.

M. Reinforcement for Metal Pan Stair Fill: 2 inch wire mesh, either hexagonal mesh at 1.5 pounds per square yard, or square mesh at 1.17 pounds per square yard.

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

O. Expansion Joint Filler: ASTM D1751.

P. Sheet Materials for Curing Concrete: ASTM C171.

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

R. Liquid Hardener and Dustproofer: Fluosilicate solution of magnesium fluosilicate or zinc fluosilicate. Magnesium and zinc may be used separately or in combination as recommended by manufacturer. Use only on exposed slab. Do not use where floor is covered with resilient flooring, paint or other finish coating.

S. Non-Shrink Grout:

1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 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 4 foot by 4 foot base plate.

T. Adhesive Binder: ASTM C881.

U. Waterstops:

3. Bentonite Waterstop: Flexible strip of bentonite 1 inch by 3/4 inch, weighing 5.85 lbs. per foot composed of Butyl Rubber Hydrocarbon (ASTM D297), Bentonite (SS-S-210-A) and Volatile Matter (ASTM D6).

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

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

2.3 CONCRETE MIXES:

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

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per cubic yard measured dry rodded and damp loose, air content, water-cement fly ash ratio, and consistency of each cylinder in terms of slump.
3. Prepare a curve showing relationship between water-cement fly ash ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.

4. If the field experience method is used, submit complete standard deviation analysis.

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

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

C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Project Manager or as specified.

D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work. Reduce this replacement to 10% for drilled piers and caissons.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. (psi)	Min. Cement (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement lbs/c. yd	Max. Water Cement Ratio
(5000)[1,3]	(630)	0.45	(650)	0.40
(4000)[1,3]	(550)	0.50	(570)	0.50
(3000)[1,3]	(470)	0.55	(490)	0.55
(3000)[1,2]	(500)	*	(520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 1200 psi in excess of f'c. For concrete strengths above 5000 psi, the proposed mix design shall achieve a compressive strength 1400 psi in excess of f’c.

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

TABLE II - MAXIMUM SLUMP, INCHES*

Type of Construction	Normal Weight Concrete
Reinforced Footings and Substructure Walls	3 inches
Slabs, Beams, Reinforced Walls, and Building Columns	4 inches

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

G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III.

TABLE III - TOTAL AIR CONTENT FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)

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

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

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

J. 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, Project Manager 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, Project Manager 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, Project Manager 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 Project Manager.

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 Project Manager. 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 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.)

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 Project Manager approves their reuse.
   2. Provide forms for concrete footings unless Project Manager determines forms are not necessary.
   3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.

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

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

D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 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 8 inches on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.

F. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 6 inches

above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 18 inches on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

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

1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
3. Do not install sleeves in beams, joists or columns except where shown or permitted by Project Manager. Install sleeves in beams, joists, or columns that are not shown, but are permitted by the Project Manager, 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.

H. Construction Tolerances:

1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary

for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.

2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT:

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

B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.

1. Place reinforcing bars accurately and tie securely at intersections and splices with 16 gauge black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 12 inches in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 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 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. 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 Project Manager, 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 Project Manager.

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. Vapor barrier joints lapped 6 inches and sealed with compatible waterproof pressure-sensitive tape.
2. Patch punctures and tears.

3.4 SLABS RECEIVING RESILIENT COVERING

A. Slab shall be allowed to cure for 6 weeks minimum prior to placing resilient covering. After curing, slab shall be tested by the Contractor for moisture in accordance with ASTM D4263 or ASTM F1869. Moisture content shall be less than 3 pounds per 1000 sf prior to placing covering.

B. In lieu of curing for 6 weeks, Contractor has the option, at his own cost, to utilize the Moisture Vapor Emissions & Alkalinity Control Sealer as follows:

1. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient

flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.

2. 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.
   a. 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.
   b. 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.
   c. 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 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 Project Manager.

B. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.

C. Place concrete for columns slowly and in one operation between joints. Install joints in concrete columns at underside of deepest beam or girder framing into column.

D. Allow 2 hours to elapse after column is cast before concrete of supported beam, girder or slab is placed. Place girders, beams, grade beams, column capitals, brackets, and haunches at the same time as slab unless otherwise shown.

3.6 EXPANSION JOINTS AND CONTRACTION JOINTS:

A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

B. Provide contraction (control) joints in floor slabs as indicated on the contract drawings. Joints shall be either formed or saw cut, to the indicated depth after the surface has been finished. Complete saw

joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.7 PLACING CONCRETE:

A. Preparation:
   1. Remove hardened concrete, wood chips, shavings and other debris from forms.
   2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
   3. Have forms and reinforcement inspected and approved by Project Manager before depositing concrete.
   4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
   1. Preparing surface for applied topping:
      a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
      b. Broom clean and keep base slab wet for at least four hours before topping is applied.
      c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of Project Manager.

D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
   1. 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.
   2. Do not drop concrete freely more than 10 feet for concrete containing the high-range water-reducing admixture (superplasticizer).
   3. 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 or 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 20 inches in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
6. On bottom of members with severe congestion of reinforcement, deposit 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.

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 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:

A. 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 Project Manager.

3.9 COLD WEATHER:

A. 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 Project Manager.

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 Project Manager.

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 400 square feet per gallon on steel troweled surfaces and 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 2 inches. Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 2 inches. Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

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. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

C. Reshoring: Reshoring is required if superimposed load plus dead load of the floor exceeds the capacity of the floor at the time of loading. Reshoring accomplished in accordance with ACI 347 at no additional cost to the Government.

3.12 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 1 inch. Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 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 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 Project Manager, 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.

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 Project Manager 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 Project Manager 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 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 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 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 Project Manager from sample panel.
11. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
    a. Areas covered with carpeting, or not specified otherwise in b. below:
        1) Slab on Grade:
            a) Specified overall value F_F 25/F_L 20
            b) Minimum local value F_F 17/F_L 15
        2) Level suspended slabs (shored until after testing) and topping slabs:
            a) Specified overall value FF 25/FL 20
            b) Minimum local value FF 17/FL 15
        3) Level tolerance such that 80 percent of all points fall within a 3/4 inch envelope +3/8 inch, -3/8 inch from the design elevation.
    b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:

1) Slab on grade:
   a) Specified overall value FF 36/FL 20
   b) Minimum local value FF 24/FL 15
2) Level suspended slabs (shored until after testing) and topping slabs
   a) Specified overall value FF 30/FL 20
   b) Minimum local value FF 24/FL 15
3) Level tolerance such that 80 percent of all points fall within a 3/4 inch envelope +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. Contractor retained testing laboratory will take measurements as directed by Project Manager, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 48 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 Contractor retained testing laboratory.

b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

13. Acceptance/ Rejection:

a. If individual slab section measures less than either of specified minimum local F_F/F_L numbers, that section shall be rejected and

remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.

b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall F_F/F_L numbers, then whole slab shall be rejected and remedial measures shall be required.

14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Project Manager, 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.

B. Liquid Densifier/Sealer: Apply in accordance with manufacturer's directions just prior to completion of construction.

3.15 APPLIED TOPPING:

A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 8 inches for concrete containing a high-range water-reducing admixture (superplasticizer) and 4 inches for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.

B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

3.16 RETAINING WALLS:

A. Use air-entrained concrete.

B. Expansion and contraction joints, waterstops, weep holes, reinforcement and railing sleeves installed and constructed as shown.

C. Exposed surfaces finished to match adjacent concrete surfaces, new or existing.

D. Place porous backfill as shown.

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SECTION 04 05 13
MASONRY MORTARING

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies mortar materials and mixes.

1.2 RELATED WORK:

A. Mortar used in Section:
   1. Section 04 72 00, CAST STONE MASONRY.

1.3 TESTING LABORATORY-CONTRACTOR RETAINED

A. Engage a commercial testing laboratory approved by Project Manager to perform tests specified below.
B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Project Manager.

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 Project Manager.
E. After tests have been made and materials approved, do not change without additional test and approval of Project Manager.
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 2500 psi at 28 days.
         Type S: Minimum 1800 psi at 28 days.
         Type N: Minimum 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.

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
C109-08.....Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-MM Cube Specimens)
C144-04.....Aggregate for Masonry Mortar
C150-09.....Portland Cement
C207-06.....Hydrated Lime for Masonry Purposes
C270-10.....Mortar for Unit Masonry
C307-03(R2008).....Tensile Strength of Chemical - Resistant Mortar, Grouts, and Monolithic Surfacing
C321-00(R2005).....Bond Strength of Chemical-Resistant Mortars

C348-08.....Flexural Strength of Hydraulic Cement Mortars
C595-10.....Blended Hydraulic Cement
C780-10.....Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
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.
   2. White plastering sand meeting sieve analysis for mortar joints for pointing except that 100 percent passes No. 8 sieve, and not more than 5 percent retained on No. 16 sieve.
B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

2.3 MASONRY CEMENT

A. ASTM C91. Type N, S, or M.
B. Use white masonry cement whenever white mortar is specified.

2.4 MORTAR CEMEMT

ASTM C1329, Type N, S or M.

2.5 PORTLAND CEMENT

A. ASTM C150, Type I.
B. Use white Portland cement wherever white mortar is specified.

2.6 LIQUID ACRYLIC RESIN

A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

2.7 WATER

Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.8 POINTING MORTAR

A. For Cast Stone: 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, unless approved by Project Manager.
   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.

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.
E. Pointing Mortar:
   1. Mix dry ingredients with enough water to produce a damp mixture of workable consistency which will retain its shape when formed into a ball.
   2. Allow mortar to stand in dampened condition for one to 1-1/2 hours.
   3. Add water to bring mortar to a workable consistency prior to application.

3.2 MORTAR USE LOCATION

A. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered), masonry below grade and setting cast stone.
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.
D. Use pointing mortar for items specified.

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SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies requirements for construction of masonry unit walls.

1.2 RELATED WORK

A. Mortars: Section 04 05 13, MASONRY MORTARING.

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.

F. Color and texture of masonry units: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Samples:

1. Face brick, sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
2. Anchors, and ties, 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.

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.
3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.

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 Project Manager 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", 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-09.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
A675/A675M-03(R2009)....Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical PropertiesC34-03 Structural Clay Load-Bearing Wall Tile
C62-10.....Building Brick (Solid Masonry Units Made From Clay or Shale)
C67-09.....Sampling and Testing Brick and Structural Clay Tile
C126-10.....Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
C216-10.....Facing Brick (Solid Masonry Units Made From Clay or Shale)
C476-10.....Standard Specification for Grout for Masonry
C612-10.....Mineral Fiber Block and Board Thermal Insulation
D1056-07.....Flexible Cellular Materials - Sponge or Expanded Rubber
D2000-08.....Rubber Products in Automotive Applications
D2240-05(R2010).....Rubber Property - Durometer Hardness

D3574-08.....Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams

F1667-11.....Fasteners: Nails, Spikes and Staples

C. Masonry Industry Council:

Hot and Cold Weather Masonry Construction Manual-98 (R2000).

D. American Welding Society (AWS):

D1.4-11 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 TMS 602-08/ACI 530.1-08/ASCE 6-08 (2008 MSJC Book Version TMS-0402-08).

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:
   a. Modular

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. For molded faces used as a finished surface, use concrete masonry units with uniform fine to medium surface texture unless specified otherwise.

2.3 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 0.16 inches less than nominal width of masonry wall or partition.
   4. Cross wires welded to longitudinal wires.
   5. Joint reinforcement at least 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 16 inch to longitudinal wires.
   9. Ladder Design:
      a. Longitudinal wires deformed 0.16 inch diameter wire.
      b. Cross wires 0.16 inch diameter.
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. Angle Type:
      a. Anchor: Minimum 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 0.20 inch diameter galvanized cold drawn steel wire. Form "L" shape to be embedded not less than 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 2 inches of vertical adjustment.
D. Dovetail Anchors:
   1. Corrugated steel dovetail anchors formed of 0.0598 inch thick by 1 inch wide galvanized steel, 3-1/2 inches long where used to anchor 4 inch nominal thick masonry units, 5-1/2 inches long for masonry units more than 4 inches thick.
   2. Triangular wire dovetail anchor 4 inch wide formed of 9 gage steel wire with galvanized steel dovetail insert. Anchor length to extend at least 3 inches into masonry, 1 inch into 1-1/2 inch thick units.
   3. Form dovetail anchor slots from 0.0239 inch thick galvanized steel (with felt or fiber filler).
E. Adjustable Steel Column Anchor:
   1. Two piece anchor consisting of a 1/4 inch diameter steel rod to be welded to steel with offset ends, rod to permit 4 inch vertical adjustment of wire anchor.

2. Triangular shaped wire anchor 4 inches wide formed from 3/16 inch diameter galvanized wire, to extend at least 3 inches into joints of masonry.

F. Adjustable Steel Beam Anchor:

1. Z or C type steel strap, 1 1/4 inches wide, 1/8 inch thick.
2. Flange hook not less than 1 1/2 inches long.
3. Length to embed in masonry not less than 2 inches in 4 inch nominal thick masonry and 4 inches in thicker masonry.
4. Bend masonry end not less than 1 1/2 inches.

2.4 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.

2.5 ACCESSORIES

A. Weep Vent:

1. Polypropylene, honeycomb design to allow passage of moisture from cavity to exterior.
2. 3/8” x 2 ½” x 3 3/8”.
3. Other spacing material having similar characteristics may be used subject to the Project Manager's approval.

B. 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.

C. 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".

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 10 feet - 1/4 inch.
   2. In 20 feet - 3/8 inch.
   3. In 40 feet or more - 1/2 inch.
C. Maximum variation from level:
   1. In any bay or up to 20 feet - 1/4 inch.
   2. In 40 feet or more - 1/2 inch.
D. Maximum variation from linear building lines:
   1. In any bay or up to 20 feet - 1/2 inch.
   2. In 40 feet or more - 3/4 inch.
E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:
   1. Minus 1/4 inch.
   2. Plus 1/2 inch.
F. Maximum variation in prepared opening dimensions:
   1. Accurate to minus 0 inch.
   2. Plus 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 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. Corridor walls.
   c. Reinforced masonry partitions

F. Lintels:
1. Lintels are not required for openings less than 3 feet 4 inches wide that have hollow metal frames.
2. Openings 3 feet 5 inches wide to 5 feet 4 inches wide with no structural steel lintel or frames, require a lintel formed of concrete masonry lintel or bond beam units filled with grout per ASTM C476 and reinforced with 1-#5 rod top and bottom for each 4 inches of nominal thickness unless shown otherwise.
3. Use steel lintels, for openings over 5 feet 4 inches wide, brick masonry openings unless shown otherwise.
4. Length for minimum bearing of 4 inches at ends.

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 4 inches long.

H. Use not less than 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 walls 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 1 inch 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. Wetting and Wetting Test:
1. Test and wet brick in accordance with BIA 11B.
2. Do not wet concrete masonry units before laying.

M. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

N. 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.

O. 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.

P. 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.

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 16 inches on center vertically at each stud.

B. Veneer to Concrete Walls:
1. Install dovetail slots in concrete vertically at 2 feet on centers.
2. Locate dovetail anchors at 16 inch maximum vertical intervals.
3. Anchor new masonry facing to existing concrete with corrugated wall ties spaced at 16 inch maximum vertical intervals, and at 2 feet maximum horizontal intervals. Fasten ties to concrete with power actuated fasteners or concrete nails.

C. Anchorage of Abutting Masonry:
   1. Anchor interior masonry bearing walls or interior masonry partitions over 4 inches thick to masonry walls with rigid wall anchors spaced at 16 inch maximum vertical intervals.
D. Anchorage to Steel Beams or Columns:
   1. Use adjustable beam anchors on each flange.
   2. At columns weld the 1/4 inch steel rod to steel columns at 12 inch intervals, and place wire ties in masonry courses at 16 inches maximum vertically.

3.5 REINFORCEMENT

A. Joint Reinforcement:
   1. Use as joint reinforcement in single wythe concrete masonry unit walls or partitions.
   2. Brick veneer over frame backing walls does not require joint reinforcement.
   3. Locate joint reinforcement in mortar joints at 16 inch maximum vertical intervals.
   4. Additional joint reinforcement is required in mortar joints at both 8 inches and 16 inches above and below windows, doors, louvers and similar openings in masonry, except where other type anchors are required for anchorage of masonry to concrete structure.
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-#5 reinforcing steel unless shown otherwise. Do not cut reinforcement.
      b. Brake bond beams only at expansion joints and at control joints, if shown.

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. Use standard notched concrete masonry units (sash blocks) made in full and half-length units where shear keys are used to create a continuous vertical joint

E. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.

F. 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 AND SEISMIC 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.
6. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
7. Lay brick for sills with wash and drip.
8. Build solid brickwork as required for anchorage of items.

C. Joints:
1. Exterior and interior joint widths: Lay for three equal joints in eight inches vertically, unless shown otherwise.
2. Rake joints for pointing with colored mortar when colored mortar is not full depth.

D. Weep Vents:
1. Install weep holes at 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. Provide weep vents made of polypropylene insulation strips in cavity.
3. Install sand or pea gravel in cavity approximately 3 inches high between weep vents.
4. Veneer Framed Walls:
   a. Build with 4 inches of face brick over sheathed stud wall with air space.
   b. Keep air space clean of mortar accumulations and debris.

3.10 CONCRETE

A. Kind and Users:
1. Provide special concrete masonry shapes as required, including lintel and bond beam units and corner units. Use solid concrete masonry units, where full units cannot be used, or where needed for anchorage of accessories.
2. Provide solid load-bearing concrete masonry units or grout the cell of hollow units at jambs of openings in walls, where structural members impose loads directly on concrete masonry, and where shown.
3. Masonry assemblies shall meet the required fire resistance in fire rated partitions of type and construction that will provide fire rating as shown.
   a. Set units according to applicable requirements specified for concrete masonry units.

B. Laying:

1. Lay concrete masonry units with 3/8 inch joints, with a bond overlap of not less than 1/4 of the unit length.
2. Do not wet concrete masonry units before laying.
3. Bond external corners of partitions by overlapping alternate courses.
4. Lay first course in a full mortar bed.
5. Set anchorage items as work progress.
6. Where ends of anchors, bolts, and other embedded items, project into voids of units, completely fill such voids with mortar or grout.
7. Provide a 1/4 inch open joint for caulking between exterior walls, concrete work, and abutting masonry partitions.
8. Lay concrete masonry units with full face shell mortar beds and fill head joint beds for depth equivalent to face shell thickness.
9. Lay concrete masonry units so that cores of units, that are to be filled with grout, are vertically continuous with joints of cross webs of such cores completely filled with mortar. Unobstructed core openings not less than 2 inches by 3 inches.
10. Do not wedge the masonry against the steel reinforcing. Minimum 1/2 inch clear distance between reinforcing and masonry units.
11. Install deformed reinforcing bars of sizes shown.
12. Steel reinforcement, at time of placement, free of loose flaky rust, mud, oil, or other coatings that will destroy or reduce bond.
13. Steel reinforcement in place before grouting.
14. Minimum clear distance between parallel bars: One bar diameter.
15. Hold vertical steel reinforcement in place by centering clips, caging devices, tie wire, or other approved methods, vertically at spacings noted.
16. Support vertical bars near each end and at intermediate intervals not exceeding 192 bar diameters.
17. Reinforcement shall be fully encased by grout or concrete.
18. Splice reinforcement or attach reinforcement to dowels by placing in contact and secured or by placing the reinforcement within 1/5 of the required bar splice length.
19. Stagger splices in adjacent horizontal reinforcing bars. Lap reinforcing bars at splices a minimum of 40 bar diameters.
20. Grout cells of concrete masonry units, containing the reinforcing bars, solid as specified under grouting.
21. Cavity and joint horizontal reinforcement may be placed as the masonry work progresses.

22. Rake joints 1/4 to 3/8 inch deep for pointing with colored mortar when colored mortar is not full depth.

3.11 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.

3.12 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.

C. Puddling Method:

1. Double wythe masonry constructed grouted in lifts not to exceed 300 mm (12 inches) or less than 50 mm (2 inches) wide.
2. Consolidate by puddling with a grout stick during and immediately after placing.
3. Grout the cores of concrete masonry units containing the reinforcing bars solid as the masonry work progresses.

D. Low Lift Method:

1. Construct masonry to a height of 1.5 m (5 ft) maximum before grouting.
2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

3.13 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. 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.

D. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

3.14 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 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. Grouting:

1. Use “Fine Grout” per ASTM C476 for filling spaces less than 4 inches in one or both horizontal directions.
2. Use “Coarse Grout” per ASTM C476 for filling 4 inch spaces or larger in both horizontal directions.

F. Low-Lift Grouting:

1. Provide minimum clear dimension of 2 inches and clear area of 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 10 feet.
3. Lay CMU to maximum pour height. Do not exceed 5 foot height, or if bond beam occurs below 5 foot height, stop pour 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 1-1/2 inches below top course of pour.
5. Bond Beams: Stop grout in vertical cells 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.

3.15 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 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. Brick Units:
1. Clean as recommended by brick manufacturer. Protect light colored mortar joints from discoloration during cleaning.
2. Prepare schedule of test locations.

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SECTION 04 72 00
CAST STONE MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies manufactured concrete units to simulate a natural stone.

B. Installation of cast stone units.

1.2 RELATED WORK

A. Setting and pointing mortar: Section 04 05 13, MASONRY.

B. Joint sealant and application: Section 07 92 00, JOINT SEALANTS.

C. Color and texture specified in Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Cast stone, sample panel, size 4 by 12 by 12 inches each color and finish.
2. Show finish on two 4-inch edges and 12 by 12 inch surface.

C. Shop Drawings:

1. Cast stone showing exposed faces, profiles, cross sections, anchorage, reinforcing, jointing and sizes.
2. Setting drawings with setting mark.

D. Certificates: Test results indicating that the cast stone meets specification requirements and proof of plant certification.

E. Submit manufacturers test results of cast stone previously made by manufacturer.

F. Laboratory Data: Description of testing laboratories facilities and qualifications of its principals and key personnel.

G. List of jobs furnished by the manufacturer, which were similar in scope and at least three (3) years of age.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store cast stone under waterproof covers on planking clear of ground.

B. Protect from handling, dirt, stain, and water damage.

C. Mark production units with the identification marks as shown on the shop drawings.

D. Package units and protect them from staining or damage during shipping and storage.

E. Provide an itemized list of product to support the bill of lading.

1.5 WARRANTY

Warranty exterior masonry walls against moisture leaks, any defects and subject to terms of "Warranty of Construction", except that warranty period shall be two years.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. Cast Stone Institute Technical Manual and Cast Stone Institute standard specifications.

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

A167-99(R2009).....Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A185-07.....Steel, Welded Wire Fabric, Plain for Concrete
A615/A615M-09.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C33-11.....Concrete Aggregates
C150-09.....Portland Cement
C568-10.....Limestone Dimension Stone
C979-10.....Pigments for Integrally Colored Concrete
C1194-03.....Compressive Strength of Architectural Cast Stone
C1195-03.....Absorption of Architectural Cast Stone
C1364-10.....Architectural Cast Stone.
D2244-09.....Calculation of Color Differences from Instrumentally Measured Color Coordinates.

1.7 QUALITY ASSURANCE

A. The Manufacturer:

1. Must have five (5) years minimum continuous operating experience and have facilities for manufacturing cast stone as described herein. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of cast stone required in accordance with the project schedule.
2. Must be a member of the Cast Stone Institute.
3. Must have a certified plant (certification by the Cast Stone Institute).

B. Stone setter: Must have five (5) years experience setting cast or natural building stone.

C. Testing: One (1) sample from production units may be selected at random from the field for each 500 cubic feet delivered to the job:
   1. Three (3) field cut cube specimens from each of these sample shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as specified.
   2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
   3. Field specimens shall be tested in accordance with ASTMC 1194 and C 1195.
   4. Manufacturer shall submit a written list of projects similar and at least three (3) years of age, along with owner, architect and contractor references.

1.8 MANUFACTURING TOLERANCES

A. Cross section dimensions shall not deviate by more than + 1/8 in. from approved dimension.
B. Length of units shall not deviate by more than length/360 or + 1/8 in., whichever is greater, not to exceed + 1/4 in. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
C. Warp bow or twist of units shall not exceed length/360 or + 1/8 in. whichever is greater.
D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – On formed sides of unit, 1/8 in), on unformed sides of unit, 3/8 in maximum deviation.

1.9 MOCK-UP

Provide full size unit(s) for use in construction of sample wall. The mock-up becomes the standard of workmanship for the project.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CAST STONE

A. Comply with ASTM C 1364
B. Physical properties: Provide the following:
   1. Compressive Strength – ASTM C 1194: 6,500 psi minimum for products at 28 days.
   2. Absorption – ASTM C 1195: 6% maximum by the cold water method, or 10% maximum by the boiling method for products as 28 days.
   3. Air Content – ASTM C173 or C231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for vibrant dry tamp (VDT) products.

4. Freeze thaw - ASTM C 1364L The cumulative percent weight loss (CPWL) shall be less than 5% after 300 cycles of freezing and thawing.
5. Linear Shrinkage - ASTM C 426L Shrinkage shall not exceed 0.065%.

C. Job site testing – One (1) sample from production units may be selected at random from the field for each 500 cubic feet ($14m^3$) delivered to the job site:
1. Three (3) field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.

2.2 RAW MATERIALS

A. Portland cement – Type I or Type III, white and/or grey, ASTM C 150.
B. Coarse aggregates – Granite, quartz or limestone, ASTM C 33, except for gradation, and are optional for the vibrant dry tamp (VDT) casting method.
C. Fine aggregates – Manufactured or natural sands, ASTM C 33, except for gradation.
D. Colors – Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.
E. Admixtures- Comply with the following:
1. ASTM C 260 for air-entraining admixtures.
2. ASTM C 494/C 495 M Types A-G for water reducing, retarding, accelerating and high range admixtures.
3. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
F. Water – Potable
G. Reinforcing bars:
1. ASTM A 615/A 615M. Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 in. (37 mm).
2. Welded Wire Fabric: ASTM A 185 where applicable for wet cast units.

H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

2.3 COLOR AND FINISH

A. Match sample on file.

B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in. and the density of such voids shall be less than 3 occurrences per any 1 in^2 and not obvious under direct daylight illumination at a 5 ft. distance.

C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft distance.

D. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

1. Total color difference - not greater than 6 units.
2. Total hue difference-not greater than 2 units.

2.4 REINFORCING

A. Reinforce the units as required by the drawings and for safe handling and structural stress.

1. Minimum reinforcing shall be 0.25 percent of the cross section area.

B. Reinforcement shall be non-corrosive where faces exposed to weather are covered with less than 1.5in. of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

C. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft distance.

D. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

E. Remove cement film, if required, from exposed surface prior to packaging for shipment.

2.5 CURING

Cure units in a warm curing chamber 1000 F at 95 percent relative humidity for approximately 12hours, or cure in a 95 percent moist environment at a minimum 700F for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350-degree-days (i.e. 7 days @ 500F or 5 days @ 700F prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

PART 3 - EXECUTION

3.1 EXAMINATION

Installing contractor shall check cast stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.2 SETTING TOLERANCES

A. Comply with Cast Stone Institute SM Technical Manual.

B. Set stones 1/8 in. or less, within the plane of adjacent units.

C. Joints, plus - 1/6 in. minus - 1/8 in.

3.3 JOINTING

A. Joint size:

1. At stone/brick joints 3/8 in.
2. At stone/stone joints in vertical position 1/4 in. (3/8 in. optional).
3. Stone/stone joint exposed on top 3/8 in.

B. Joint Materials:

1. Mortar, Type N, ASTM C 270.
2. Use a full bed of mortar at all bed joints.
3. Flush vertical joints full with mortar.
4. Leave all joints with exposed tops or under relieving angles open for sealant.
5. Leave head joints in coping and projecting components open for sealant.

C. Location of joints:

1. As shown on shop drawings.
2. At control and expansion joints unless otherwise shown.

3.4 SETTING

A. Drench units with clean water prior to setting.

B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

C. Set units in full bed of mortar, unless otherwise detailed.

D. Rake mortar joints 3/4 in. in. for pointing.

E. Remove excess mortar from unit faces immediately after setting.

F. Tuck point unit joints to a slight concave profile.

3.5 JOINT PROTECTION

A. Comply with requirements of Section 07 92 00, JOINT SEALANTS.

B. Prime ends of units, insert properly sized backing rod and install required sealant.

3.6 REPAIR AND CLEANING

A. Repair chips with touchup materials furnished by manufacturer.

B. Saturate units to be cleaned prior to applying an approved masonry cleaner.

C. Consult with manufacturer for appropriate cleaners.

3.7 INSPECTION AND ACCEPTANCE

Inspect finished installation according to Bulletin #36 published by the Cast Stone Institute.

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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 Decking: Section 05 31 00, STEEL DECKING.

D. 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 Project Manager.

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 ASD Manual, Ninth Edition, Page 1-145 except as follows:

A. Elevation tolerance for column splice points at time member is erected is 3/8 inch.

B. Elevation tolerance for top surface of steel beams and girders at connections to columns at time floor is erected is 1/2 inch.

C. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 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 Project Manager 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 Project Manager. 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 - Allowable Stress Design.

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. 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 (Second Edition, 2005)

2. Code of Standard Practice for Steel Buildings and Bridges (2010).

C. American National Standards Institute (ANSI):

B18.22.1-65(R2008).....Plain Washers

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

A6/A6M-09.....Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A36/A36M-08.....Standard Specification for Carbon Structural Steel
A53/A53M-10.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A123/A123M-09.....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A242/A242M-04(R2009)....Standard Specification for High-Strength Low-Alloy Structural Steel
A283/A283M-03(R2007)....Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
A307-10.....Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A490-10.....Standard Specification for Heat-Treated Steel Structural Bolts 150 ksi Minimum Tensile Strength
A500/A500M-10.....Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A501-07.....Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
A572/A572M-07.....Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A992/A992M-06.....Standard Specification for Structural Steel Shapes

E. American Welding Society (AWS):
D1.1/D1.1M-10.....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 A572, Grade 50 or A992.

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.
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 - Allowable Stress Design and Plastic 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. Do not apply paint to following:

1. Surfaces within 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.

C. 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 Project Manager 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 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.

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):

A36/A36M-08.....Standard Specification for Carbon Structural Steel

ASTM A1008/A1008M-12....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.

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

C423-09a.....Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C. American Institute of Steel Construction (AISC):

360-10.....Specification for Structural Steel Buildings.

D. American Iron and Steel Institute (AISI):

S100-07.....North American Specification for the Design of Cold-Formed Steel Structural Members, 2007 Edition with Supplement 2.aisc

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. Miscellaneous Steel Shapes: ASTM A36.

E. Welding Electrode: E60XX minimum.

F. 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 18 gauge sheet steel.

2. Continuous Sheet Metal Edging: At openings and roof deck edges. Same quality as deck units but not less than 18 gauge steel.
3. Metal Closure Strips: For openings between decking and other construction, of not less than 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. Ridge and Valley Plates: Provide 18 gauge, minimum 4 inch wide ridge and valley plates where roof slope exceeds 1/2 inch per foot.
5. Cant Strips: Provide bent metal 45 degree leg cant strips where indicated on the Drawings. Fabricate cant strips from 20 gauge metal with a minimum 5 inch face width.
6. Seat Angles for Deck: Provide where a beam does not frame into a column.
7. Sump Pans for Roof Drains: Fabricated from single piece of minimum 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 3 inches wide. Recess pans not less than 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 roof 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, except for interstitial levels.

E. Place steel decking units at right angles to supporting members. End laps of sheets of roof deck shall be a minimum of 2 inches and shall occur over supports.

F. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members by not less than 5/8 inch diameter puddle welds or elongated welds of equal strength, spaced not more than 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 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 5 feet. Fasten at midspan or 3 feet o.c., whichever is smaller.
4. Fasten roof deck units to steel supporting members by not less than 5/8 inch diameter puddle welds or elongated welds of equal strength, spaced not more than 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 5 feet between supports, at intervals not exceeding 3 feet o.c., or midspan, whichever is closer, using self-tapping No. 8 or larger machine screws.
6. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 30 psf.

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 Project Manager. 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:

A. 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:

A. Areas scarred during erection.
B. 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 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior load-bearing steel stud walls.
2. Exterior non-load-bearing steel stud curtain wall.
3. Steel joists.

1.2 RELATED WORK:

A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.

B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

C. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.

B. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated.
2. Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Non-load-Bearing Curtain wall: Lateral deflection of 1/600 of the wall height.
   b. Floor Joists: Vertical deflection of 1/240 of the span.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental

effects when subject to a maximum ambient temperature change (range) of 120 degrees F.

4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

5. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

6. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.

D. For cold-formed metal framing indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.

E. Delegated Design: Submit design calculations and structural data.

1.5 APPLICABLE PUBLICATIONS:

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

B. American Iron and Steel Institute (AISI):

Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

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

A36/A36M-08.....Standard Specifications for Carbon Structural Steel

A123/A123M-09.....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09.....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-10.....Standard Specifications for Carbon Steel Bolts and Studs

A653/A653M-10.....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C1107/C1107M-08.....Standard Specifications for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

E488-96(R2003).....Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

E1190-95(R2007).....Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members

D. American Welding Society (AWS):

D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel for joists, studs and accessories 16 gage and heavier: ASTM A653, structural steel, zinc coated with a yield of 50 ksi minimum.

B. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated G60 with a yield of 33 ksi minimum.

C. Galvanizing Repair Paint: MIL-P-21035B.

D. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and a 30 minute working time.

2.2 WALL FRAMING:

A. Steel Studs: Manufacturer’s standard C-shaped steel studs of web depth indicated, with lipped flanges, and complying with the following:

1. Design Uncoated-Steel Thickness:

   0.0474 inch.

2. Flange Width:

   1-5/8 inches.

3. Web: Punched.

B. Steel Track: Manufacturer’s standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: Matching steel studs.

2. Flange Width: Manufacturer’s standard deep flange where indicated, standard flange elsewhere.

2.3 JOIST FRAMING:

A. Steel Joists: Manufacturer’s standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the following:

1. Design Uncoated-Steel Thickness:

   0.0474 inch

2. Flange Width: 2 inches.

B. Steel Joist Track: Manufacturer’s standard U-shaped steel joist track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: Matching steel joists.

2. Flange Width: 2 inches.

2.4 FRAMING ACCESSORIES:

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33 ksi.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.

2. Bracing, bridging, and solid blocking.

3. Web stiffeners.

4. Gusset plates.

5. Deflection track and vertical slide clips.

6. Stud kickers and girts.

7. Joist hangers and end closures.

8. Reinforcement plates.

2.5 ANCHORS, CLIPS, AND FASTENERS:

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 REQUIREMENTS:

A. Welding in accordance with AWS D1.3

B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

A. Framing components may be preassembled into panels. Panels shall be square with components attached.

B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

C. Hold members in place until fastened.

D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer’s instructions with screw penetrating joined members by not less than 3 exposed screw threads.

E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

A. Handle and lift prefabricated panels in a manner as to not distort any member.

B. Securely anchor tracks to supports as shown.

C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.

D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.

G. Install headers in all openings that are larger than the stud spacing in that wall.

H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.

I. Studs in one piece for their entire length, splices will not be permitted.

J. Provide a load distribution member at top track where joist is not located directly over bearing stud.

K. Provide joist bridging and web stiffeners at reaction points where shown.

L. Provide end blocking where joist ends are not restrained from rotation.

M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one-half joist span and when floor and roof openings interrupt one or more spanning members.

N. Provide temporary bracing and leave in place until framing is permanently stabilized.

O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.

P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer’s standard punched openings.

3.3 TOLERANCES:

A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.

B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.

C. Spacing of studs shall not be more than 1/8 inch +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

D. Prefabricated panels shall be not more than 1/8 inch +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall and Ceiling Mounted Items
2. Loose Lintels
3. Shelf Angles
4. Ladders
5. Railings

1.2 RELATED WORK

A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.

B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Prime and finish painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA,

B. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

C. Manufacturer's Certificates:

1. Anodized finish as specified.
2. Live load designs as specified.

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

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

1.4 QUALITY ASSURANCE

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

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

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

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

1.5 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97.....Wood Screws

B18.2.2-87(R2005).....Square and Hex Nuts

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

A36/A36M-08.....Structural Steel

A47-99(R2009).....Malleable Iron Castings

A48-03(R2008).....Gray Iron Castings

A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-10.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A312/A312M-09.....Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A391/A391M-07.....Grade 80 Alloy Steel Chain

A653/A653M-10.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A786/A786M-09.....Rolled Steel Floor Plate

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-03(R2009).....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
F436-10.....Hardened Steel Washers
F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs
F1667-11.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):
D1.1-10.....Structural Welding Code Steel
D1.2-08.....Structural Welding Code Aluminum
D1.3-08.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)
AMP 521-01.....Pipe Railing Manual
AMP 500-06.....Metal Finishes Manual
MBG 531-09.....Metal Bar Grating Manual
MBG 532-09.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:
SP 1-04.....No. 1, Solvent Cleaning
SP 2-04.....No. 2, Hand Tool Cleaning
SP 3-04.....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):
RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.
B. Ladders and Rungs: 250 pounds at any point.
C. Railings and Handrails: 200 pounds in any direction at any point.
D. Floor Plates, Gratings, Covers, Trap Doors, Catwalks, and Platforms: 100 pounds per square foot.
E. Manhole Covers: 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. Floor Plate:
1. Steel ASTM A786.
2. Aluminum: ASTM B632.

E. Steel Pipe: ASTM A53.
   1. Galvanized for exterior locations.
   2. Type S, Grade A unless specified otherwise.
   3. NPS (inside diameter) as shown.
F. Cast-Iron: ASTM A48, Class 30, commercial pattern.
G. Malleable Iron Castings: A47.
H. Primer Paint: As specified in Section 09 91 00, PAINTING.
I. Stainless Steel Tubing: ASTM A269, type 302 or 304.
J. Modular Channel Units:
   1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
   2. Form channel 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 0.0125 inch thick stainless steel.
K. Grout: ASTM C1107, pourable type.
L. Insect Screening: ASTM D3656.

2.3 HARDWARE

A. Rough Hardware:
   1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
   2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.
B. Fasteners:
   1. Bolts with Nuts:
      a. ASME B18.2.2.
      b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
      c. ASTM F468 for nonferrous bolts.
      d. ASTM F593 for stainless steel.
   2. Screws: ASME B18.6.1.

3. Washers: ASTM F436, type to suit material and anchorage.
4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.4 FABRICATION GENERAL

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

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

C. Connections
1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

D. Fasteners and Anchors
1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.

3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

E. Workmanship

1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.
   c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
   d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
   e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
   f. Prepare members for the installation and fitting of hardware.
   g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
   h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.
3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.

4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 1-1/4 by 1/8 inch steel strap anchors, 6 inches long with one inch hooked end, to back of member at 2 feet on center, unless otherwise shown.
   b. Where metal fabrications are shown to be built into masonry use 1-1/4 by 1/8 inch steel strap anchors, 10 inches long with 2 inch hooked end, welded to back of member at 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. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
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.

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:
a. Steel strip or hat channel minimum of 0.0598 inch thick.
b. Steel strip minimum of 6 inches wide, length extending one stud space beyond end of item supported.
c. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.
d. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
e. Use wall-mounted factory finished steel (1/8” thickness) brackets to support countertops where indicated. The basis of design for countertop brackets is A & M Hardware Inc., Manheim, PA. 17545 (888-647-0200). Load limit for countertop brackets shall be 1,000 lbs.

C. For Trapeze Bars:

1. Construct assembly above ceilings as shown and design to support not less than a 750 pound working load at any point.
2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
3. Fabricate concealed components of structural steel shapes unless shown otherwise.
4. Stainless steel ceiling plate drilled for eye bolt.
5. Continuously weld connections where welds shown.
6. Use modular channel where shown with manufacturers bolts and fittings.
   a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
   b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

D. Supports for Ceiling Mounted 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 structure.

E. Supports for Operable Partition Tracks and Items at Various Conditions at Suspended Ceilings:
1. Fabricate of structural steel shapes as shown.
2. Drill for anchor bolts of suspended item.

2.6 FRAMES

A. Elevator Entrance Wall Opening (coordinate with elevator manufacturer).
1. Fabricate of channel shapes, plates, and angles as shown.
2. Weld or bolt head to jamb as shown.
3. Weld clip angles to bottom of frame and top of jamb members extended to structure above for framed construction.
   a. Provide holes for anchors.
   b. Weld head to jamb members.

2.7 GUARDS

A. Wall Corner Guards:
1. Fabricate from steel angles and furnish with anchors as shown.
2. Continuously weld anchor to angle.

B. Guard Angles for Overhead Doors:
1. Cut away top portion of outstanding leg of angle and extend remaining portion of angle up wall.

2. Weld filler piece across head of opening to jamb angles.
3. Make provisions for fasteners and anchorage.

2.8 COVERS AND FRAMES FOR MECHANICAL CHASES

A. Fabricate covers to support live loads specified.
B. Galvanized steel members after fabrication in accordance with ASTM A123, G-90 coating.
C. Steel Frames:
1. Form frame from structural steel angles as shown. Where not shown use 2-1/2 x 2-1/2 x 1/4 inch angles for frame openings over 4 feet long and 2 ix 2 x 1/4 inch for frame openings less than 4 feet.
2. Fabricate intermediate supporting members from steel "T's" or angles; located to support cover section edges.
3. Where covers are required use steel border bars at frames so that top of cover will be flush with frame and finish floor.
4. Weld steel strap anchors to frame. Space straps not over 24 inches o.c., not shown otherwise between end anchors. Use 1/4 x 1 x 8 inches with 2 inch bent ends strap anchors unless shown otherwise.
5. Drill and tap frames for screw anchors where plate covers occur.

2.9 GRATINGS

A. Fabricate gratings to support live loads specified and a concentrated load as specified.
B. Provide clearance at all sides to permit easy removal of grating.
C. Make cutouts in gratings with 6 mm (1/4 inch) minimum to one inch maximum clearance for penetrations or passage of pipes and ducts. Edge band cutouts.
D. Fabricate in sections not to exceed 25 square feet in area and 200 pounds in weight.
E. Fabricate sections of grating with end-banding bars.
F. Fabricate angle frames and supports, including anchorage as shown.
1. Fabricate intermediate supporting members from "T's" or angles.
2. Locate intermediate supports to support grating section edges.
3. Fabricate frame to finish flush with top of grating.
4. Locate anchors at ends and not over 24 inches o.c.
5. Butt or miter, and weld angle frame at corners.
G. Steel Bar Gratings:
1. Fabricate grating using steel bars, frames, supports and other members shown in accordance with Metal Bar Grating Manual.
2. Galvanize steel members after fabrication in accordance with ASTM A123, G-90 for exterior gratings, gratings in concrete floors, and interior grating where specified.

2.10 LOOSE LINTELS

A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.

B. Fabricate lintels with not less than 6 inch bearing at each end for nonbearing masonry walls, and 8 inch bearing at each end for bearing walls.

C. Provide one angle lintel for each 4 inches of masonry thickness as follows except as otherwise specified or shown.

1. Openings 2-1/2 feet to 6 feet - 4 x 3-1/2 x 5/16 inch.
2. Openings 6 feet to 10 feet - 6 x 3-1/2 x 3/8 inch.

D. For 6 inch thick masonry openings 2-1/2 feet to 10 feet use one angle 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 3/4 inch bolts spaced at 12 inches on centers.

G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.

H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

I. Elevator Entrance:

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

2.11 SHELF ANGLES

A. Fabricate from steel angles of size shown.

B. Fabricate angles with horizontal slotted holes for 19 mm (3/4 inch) bolts spaced at not over 900 mm (3 feet) on centers and within 300 mm (12 inches) of ends.

C. Provide adjustable malleable iron inserts for embedded in concrete framing.

2.12 LADDERS

A. Steel Ladders:

1. Fixed-rail type with steel rungs shouldered and headed into and welded to rails.
2. Fabricate angle brackets of 2 inch wide by 1/2 inch thick steel; brackets spaced maximum of 4 feet apart and of length to hold ladder 7 inches from wall to center of rungs. Provide turned ends or clips for anchoring.

3. Provide holes for anchoring with expansion bolts through turned ends and brackets.
4. Where shown, fabricate side rails curved, twisted and formed into a gooseneck.
5. Galvanize exterior ladders after fabrication, ASTM A123, G-90.

B. Ladder Rungs:
1. Fabricate from one inch diameter steel bars.
2. Fabricate so that rungs will extend at least 4 inches into wall with ends turned 2 inches, project out from wall 7 inches, be 16 inches wide and be designed so that foot cannot slide off end.
3. Galvanized after fabrication, ASTM A123, G-90 rungs for exterior use and for access to pits.

2.13 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. 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. 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 6 feet on centers between end posts.
4. 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.

1. Provide temporary bracing for such items until concrete or masonry is set.
2. Place in accordance with setting drawings and instructions.
3. Build strap anchors, into masonry as work progresses.

C. Set frames of gratings, covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.

D. Field weld in accordance with AWS.

1. Design and finish as specified for shop welding.
2. Use continuous weld unless specified otherwise.

E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.

F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

H. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

A. Anchorage to structure.

1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
2. Secure supports to concrete inserts by bolting or continuous welding as shown.
3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
4. Secure steel plate or hat channels to studs as detailed.

B. Supports for Wall Mounted items:

1. Locate center of support at anchorage point of supported item.
2. Locate support at top and bottom of wall hung cabinets.

3. Locate support at top of floor cabinets and shelving installed against walls.
4. Locate supports where required for items shown.

C. Supports for Cubicle Curtain Track:
1. Install assembly where shown after ceiling suspension grid is installed.
2. Drill angle for bolt and weld nut to angle prior to installation of tile.

D. Support for cantilever grab bars:
1. Locate channels or tube in partition for support as shown, and extend full height from floor to underside of structural slab above.
2. Anchor at top and bottom with angle clips bolted to channels or tube with two, 9 mm (3/8 inch) diameter bolts.
3. Anchor to floors and overhead construction with two 9 mm (3/8 inch) diameter bolts.
4. Fasten clips to concrete with expansion bolts, and to steel with machine bolts or welds.

E. Supports for Trapeze Bars:
1. Secure plates to overhead construction with fasteners as shown.
2. Secure angle brace assembly to overhead construction with fasteners as shown and bolt plate to braces.
3. Fit modular channel unit flush with finish ceiling, and secure to plate with modular channel unit manufacturer's standard fittings through steel shims or spreaders as shown.
   a. Install closure plates in channel between eye bolts.
   b. Install eyebolts in channel.

3.3 OTHER FRAMES

A. Set frame flush with surface unless shown otherwise.
B. Anchor frames at ends and not over 18 inches on centers unless shown otherwise.
C. Set in formwork before concrete is placed.

3.4 GUARDS

A. Steel Angle Corner Guards:
1. Build into masonry as the work progress.
2. Set into formwork before concrete is placed.
3. Set angles flush with edge of opening and finish floor or wall or as shown.
4. At existing construction fasten angle and filler piece to adjoining construction with 16 mm (5/8 inch) diameter by 75 mm (3 inch) long expansion bolts 450 mm (18 inches) on center.

5. Install Guard Angles at Edges of Trench, Overhead Doors where shown.

3.5 GRATINGS

A. Set grating flush with finish floor; top of curb, or areaway wall. Set frame so that horizontal leg of angle frame is flush with face of wall except when frame is installed on face of wall.

B. Set frame in formwork before concrete is placed.

C. Where grating terminates at a wall bolt frame to concrete or masonry with expansion bolts unless shown otherwise.

D. Secure removable supporting members in place with stainless steel bolts.

E. Bolt gratings to supports.

3.6 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 6 inch bearing at each end for nonbearing walls, and 8 inch bearing at each end for bearing walls.

3.7 SHELF ANGLES

A. Anchor shelf angles with 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.

3.8 LADDERS

A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.

B. In elevator pits, set ladders to clear all elevator equipment where shown on the drawings.

1. Where ladders are interrupted by division beams, anchor ladders to beams by welding, and to floors with expansion bolts.
2. Where ladders are adjacent to division beams, anchor ladders to beams with bent steel plates, and to floor with expansion bolts.

3.9 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 fixed flanged fittings to concrete with expansion bolts.
6. Secure posts to steel with welds.

B. 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.

C. Removable Rails:

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

D. Handrails:

1. Anchor brackets for metal handrails as detailed.
2. Install brackets within 12 inches of return of walls, and at evenly spaced intermediate points not exceeding 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.

3.10 STEEL COMPONENTS FOR MILLWORK ITEMS

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

3.11 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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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. Soffits for steel stairs: Sections 09 22 16, Non-Structural Metal Framing and 09 29 00 Gypsum Board.

D. Requirements for shop painting: Section 09 91 00, PAINTING.

1.3 DESIGN REQUIREMENTS:

A. Structural Performance: Engineer, fabricate, and erect metal stairs to withstand design loads within limits and under conditions required.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.

C. Delegated Design: Submit design calculations and structural data.

1.5 APPLICATION PUBLICATIONS

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

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

A36/A36M-08.....Structural Steel

A47-99 (R2009).....Ferritic Malleable Iron Castings

A48-03(R2008).....Gray Iron Castings

A53-10.....Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless

A307-10.....Carbon Steel Bolts and Studs, 60000 psi Tensile Strength

A653/653M-10.....Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated (Galvannealed) by the Hot-Dip Process

A563-07.....Carbon and Alloy Steel Nuts
A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy
A786/A786M-09.....Rolled Steel Floor Plates
A1011-10.....Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural, High-Strength, Low-Alloy

C. American Welding Society (AWS):
D1.1-10.....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 531-09)
AMP521-01.....Pipe Railing Manual, Including Round Tube

E. American Iron and Steel Institute (AISI):
2001.....Design of Cold-Formed Steel Structural Members

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. Design stairs to support a live load of 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 Grating treads in accordance with NAAMM Metal Bar Grating Manual.
D. Design pipe railings in accordance with NAAMM Pipe Railing Manual for 200 pounds in any direction at any point.

2.2 MATERIALS

A. Steel Pipe: ASTM A53, Standard Weight, zinc coated.
B. Steel Grating: Metal bar type grating NAAMM BG.
C. Sheet Steel: ASTM A1008.
D. Structural Steel: ASTM A36.
E. Steel Floor Plate: ASTM 786.
F. 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.
G. Steel Plate: ASTM A1011.
H. Iron Castings: ASTM A48, Class 30.
I. 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 connections.
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 or newel post.

E. Fabricate handrail brackets from cast malleable iron.

F. Provide standard terminal fittings at ends of post and rails.

G. Gates:
1. Fabricate from steel pipe as specified for railings.
2. Fabricate gate fittings from either malleable iron or wrought steel.
3. Hang each gate on suitable spring hinges of clamp on or through bolted type.
4. Provide suitable stops, so that gate will swing as shown.

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.

E. Construct newel posts of steel tubing having wall thickness not less than 3/16-inch, with forged steel caps and drops.

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 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).

E. Gates:

1. Hang gate to swing as shown.
2. Bolt gate hinges to jamb post with clamp on or through bolts.

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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Division 6

Woods, Plastics, and Composites

Division 6

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies wood blocking, nailers, and rough hardware.

1.2 RELATED WORK:

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

1.3 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 Society of Mechanical Engineers (ASME):
B18.2.1-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87.....Square and Hex Nuts
B18.6.1-97.....Wood Screws
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

D. American Society for Testing And Materials (ASTM):
A47-99(R2009).....Ferritic Malleable Iron Castings
A48-03(R2008).....Gray Iron Castings

A653/A653M-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-10.....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

D143-09.....Small Clear Specimens of Timber, Method of Testing

D1760-01.....Pressure Treatment of Timber Products

D2559-10.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions

D3498-11.....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems

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

F1667-08.....Nails, Spikes, and Staples

E. Commercial Item Description (CID):

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

F. Military Specification (Mil. Spec.):

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

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. 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.

C. 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.

D. 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.

E. Fire Retardant Treatment:
1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

F. Preservative Treatment:
1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood 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 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.

2.3 MOISTURE/AIR BARRIER WRAP

A. Consist of Tyvek Commercial Wrap, complete with Tyvek Tape as manufactured by DuPont.

2.4 VAPOR BARRIER

A. 6 mil polyethylene.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
   1. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.

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.

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 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 1 inch penetration into anchorage member.
   c. Spaced same as nails.

C. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking or Plates:
   a. Stagger end joints between upper and lower pieces.
   b. Nail at ends and not over 24 inches between ends.
   c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.

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SECTION 06 16 63
CEMENTITIOUS SHEATHING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies cement board sheathing applied to frame exterior soffit construction, ready to receive subsequent finishes.

1.2 RELATED WORK

A. Exterior soffit finish: Section 07 24 00, EXTERIOR INSULATION AND FINISH SYSTEM.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Cement board panels, 8 inches by 8 inches, minimum size.
2. Fasteners, each type used.
3. Reinforcing tape for joints 12 inches long.
4. Water barrier backing, 12 inches square.

C. Product Data:

1. Cement board sheathing.
2. Reinforcing tape.
3. Fasteners.

1.4 DELIVERY AND STORAGE

A. Deliver materials in containers with labels legible and intact.

B. Store materials so as 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 the text by the basic designation only.

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

C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

C1325-08.....Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

D226-09.....Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

D4586-07.....Asphalt Roof Cement, Asbestos-Free

C. Federal Specifications (FS):

UU-B-790.....Building Paper, Vegetable Fiber INT AMD 1 (Kraft, Waterproofed, Water Repellant and Fire Resistant)

D. Gypsum Association:

GA253.....Application of Gypsum Sheathing.

PART 2 - PRODUCTS

2.1 CEMENT BOARD SHEATHING

A. Conform to ASTM C1325, except as follows.

B. Property Minimum Average Value

1. Flame Spread	5
2. Smoke Density	0
3. Thickness	1/2 inch
4. Minimum Width	32 inches
5. Flexural Strength wet and dry	1000 psi
6. Fastener Holding wet and dry	125 pounds

2.2 ACCESSORY MATERIALS

A. Steel Drill Screws: ASTM C954. Modified for flat head. Bugle head not acceptable.

B. Organic Felt: ASTM D226, Type II, 13.6 kg (30 lb).

C. Roof Cement: ASTM D4586

D. Joint Reinforcing Tape:

1. Minimum 4-inches wide open mesh alkali resistant.
2. Glass fiber mesh polymer coated as recommended by Cement Board manufacturer.

E. Water Barrier: FS UU-B-790. Type I (Barrier paper), Grade D (Water-vapor permeable). Other products meeting or exceeding the Federal specification for a water barrier with water vapor permeability are acceptable.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Do not install units when temperature is below 40 degrees F.

B. Do not install joint reinforcing tape when temperature is below 50 deg F.

3.2 INSTALLATION

A. Remove wrapping and separate to allow air circulation for not less than seven days before installation.

B. Installing Water Barrier over Framing Members:

1. Apply roof cement or tape to framing members sufficient to adhere and support water barrier.
2. Use either organic felt or water barrier.
3. Apply barrier shingle fashion with horizontal joints lapped not less than 2 inches. Lap end joints over framing, not less than 4 inches cemented together with roof cement, stagger end joints.
4. Do not leave over 12-inch wide strip exposed when work is stopped.
5. Coordinate with installation of flashing to lap water barrier over flashing. Install weeps every 24 inches or as detailed, directly above flashing. Provide for clear exit of water to exterior.
6. Repair torn or cut barrier with barrier patch spanning framing space cemented to surface along top and side edges.

C. Installing Cement Board Units:
1. Apply cement board sheathing immediately over water barrier in accordance with GA-253, with rounded edges and rough side to exterior, except as specified otherwise.
2. Secure units to framing members with screws spaced not more than 8 inches on center and not closer than 1/2-inch from the edge of the unit.
3. Install screws so that the screw heads do not penetrate the surface of unit.
4. Install 1/2-inch wide horizontal control joints at floors and vertical control joints not over 16 feet on center unless shown otherwise, maintain alignment.
5. Stop units at edges of building expansion joints.
6. Minimum bearing over framing members: 3/4-inch.

3.3 PROTECTION AND REPAIR

A. Protect board with temporary coverings against moisture until subsequent finish is applied.
B. Patch and repair damaged surface prior to application of subsequent finish.
1. Fill cracks.
2. Replace loose, spalling or missing joint finish.
3. Replace broken or damaged boards.

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SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior millwork.

B. Items specified.

1. Mounting Brackets and Shelves
2. Hardwood for Stained Glass Window Frame

1.2 RELATED WORK

A. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.

B. Wood doors: Section 08 14 00, WOOD DOORS.

C. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Manufactured Plastic Casework: Section 12 32 00, MANUFACTURED WOOD CASEWORK.

E. Electrical light fixtures and duplex outlets: Division 26, ELECTRICAL.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Millwork items - Half full size scale for sections and details 1:50 (1/4-inch) for elevations and plans.
2. Show construction and installation.

C. Samples:

Plastic laminate finished plywood or particleboard, six by twelve inches.

D. Certificates:

1. Indicating fire retardant treatment of materials meet the requirements specified.
2. Indicating moisture content of materials meet the requirements specified.

E. List of acceptable sealers for fire retardant treated materials.

F. Manufacturer's literature and data:

1. Electrical components

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.

B. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by Project

Manager. Store at a minimum temperature of 21^{0}C (70^{0}F) for not less than 10 days before installation.

C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

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 Testing and Materials (ASTM):
A36/A36M-08.....Structural Steel
A53-07.....Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless
A167-99 (R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
B26/B26M-09.....Aluminum-Alloy Sand Castings
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
E84-09.....Surface Burning Characteristics of Building Materials

C. American Hardboard Association (AHA):
A135.4-04.....Basic Hardboard

D. Builders Hardware Manufacturers Association (BHMA):
A156.9-03.....Cabinet Hardware
A156.11-04.....Cabinet Locks
A156.16-02.....Auxiliary Hardware

E. Hardwood Plywood and Veneer Association (HPVA):
HP1-09.....Hardwood and Decorative Plywood

F. National Particleboard Association (NPA):
A208.1-99.....Wood Particleboard

G. American Wood-Preservers' Association (AWPA):
AWPA C1-03.....All Timber Products – Preservative Treatment by Pressure Processes

H. Architectural Woodwork Institute (AWI):
AWI-99.....Architectural Woodwork Quality Standards and Quality Certification Program

I. National Electrical Manufacturers Association (NEMA):
LD 3-05.....High-Pressure Decorative Laminates

J. U.S. Department of Commerce, Product Standard (PS):
PS20-05.....American Softwood Lumber Standard

K. Military Specification (Mil. Spec):

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

L. Federal Specifications (Fed. Spec.):

A-A-1922A.....Shield Expansion

A-A-1936.....Contact Adhesive

FF-N-836D.....Nut, Square, Hexagon Cap, Slotted, Castle

FF-S-111D(1).....Screw, Wood

MM-L-736(C).....Lumber, Hardwood

PART 2 - PRODUCTS

2.1 LUMBER

A. Grading and Marking:

1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Sizes:

1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.
2. Millwork, standing and running trim, and rails: Actual size as shown or specified.

C. Hardwood: MM-L-736, species as specified for each item.

2.2 PLYWOOD

A. Softwood Plywood:

1. Prod. Std.
2. Grading and Marking:
   a. Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
   b. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade, and compliance with PS1.
3. Plywood, 1/2 inch and thicker; not less than five ply construction, except 1-1/4 inch thick plywood not less than seven ply.

4. Shelving Plywood:
   a. Interior Type, any species group.
   b. Veneer Grade: A-B or B-C.
5. Other: As specified for item.

B. Hardwood Plywood:
1. HPVA: HP.1
2. Species of face veneer shall be as shown or as specified in connection with each particular item.
3. Inside of Building:
   a. Use Type II (interior) A grade veneer for transparent finish.
   b. Use Type II (interior) Sound Grade veneer for paint finish.
4. Use rotary cut white birch unless specified otherwise.

2.3 PLASTIC LAMINATE

A. NEMA LD-3.
B. Cabinet Interiors including Shelving: Both of following options to comply with NEMA, CLS as a minimum.
1. Plastic laminate clad plywood or particle board.
2. Resin impregnated decorative paper thermally fused to particle board.

2.4 ADHESIVE

A. For Plastic Laminate: Fed. Spec. A-A-1936.
B. For Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

2.5 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 electric-galvanizing process.
2. Fasteners:
   a. Bolts with Nuts: FF-N-836.
   b. Expansion Bolts: A-A-1922A.
   c. Screws: Fed. Spec. FF-S-111.

B. Finish Hardware
1. Cabinet Hardware: ANSI A156.9.
   a. Sliding Door Tracks: B07063.
   b. Adjustable Shelf Standards: B4061 with shelf rest B04083.
   c. Vertical Slotted Shelf Standard: B04103 with shelf brackets B04113, sized for shelf depth.
2. Auxiliary Hardware: ANSI A156.16.
   a. Shelf Bracket: B04041, japanned or enameled finish.

b. Combination Garment rod and Shelf Support: B04051 japanned or enamel finish.

c. Closet Bar: L03131 chrome finish of required length.

2.6 MOISTURE CONTENT

A. Moisture content of lumber and millwork at time of delivery to site.

1. Interior finish lumber, trim, and millwork 1-1/4 inches or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
2. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

2.7 FIRE RETARDANT TREATMENT

A. Where wood members and plywood are specified to be fire retardant treated, the treatment shall be in accordance with Mil. Spec. MIL-L19140.

B. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings.

C. Each piece of treated material shall bear identification of the testing agency and shall indicate performance in accordance with such rating of flame spread and smoke developed.

D. Treat wood for maximum flame spread of 25 and smoke developed of 25.

E. Fire Resistant Softwood Plywood:

1. Use Grade A, Exterior, plywood for treatment.
2. Meet the following requirements when tested in accordance with ASTM E84.
   a. Flame spread: 0 to 25.
   b. Smoke developed: 100 maximum

F. Fire Resistant Hardwood Plywood:

1. Core: Fire retardant treated softwood plywood.
2. Hardwood face and back veneers untreated,
3. Factory seal panel edges, to prevent loss of fire retardant salts.

2.8 FABRICATION

A. General:

1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
2. Finish woodwork shall be free from pitch pockets.
3. Except where special profiles are shown, trim shall be standard stock molding and members of the same species.
4. Plywood shall be not less than 1/2 inch, unless otherwise shown or specified.

5. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.
6. Fabricate members less than 14 feet in length from one piece of lumber, back channeled and molded a shown.
7. Interior trim and items of millwork to be painted may be fabricated from jointed, built-up, or laminated members, unless otherwise shown on drawings or specified.
8. Plastic Laminate Work:
   a. Factory glued to either a plywood or a particle board core, thickness as shown or specified.
   b. Cover exposed edges with plastic laminate.
   c. Use backing sheet on concealed large panel surface when decorative face does not occur.

B. Shelving:
1. Fabricate shelf as shown over 3/4 inch thick core.
2. Use B04041 shelf bracket.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain work areas and storage areas to a minimum temperature of 70^0F for not less than 10 days before and during installation of interior millwork.

B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work is not complete and dry.

3.2 INSTALLATION

A. General:
1. Millwork receiving transparent finish shall be primed and back-painted on concealed surfaces. Set no millwork until primed and back-painted.
2. Secure trim with fine finishing nails, screws, or glue as required.
3. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
4. Seal cut edges of preservative and fire retardant treated wood materials with a certified acceptable sealer.
5. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
6. Plumb and level items unless shown otherwise.

7. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

B. Shelves:

1. Install vertical slotted shelf standards, ANSI A156.9, B04103 to studs with toggle bolts through each fastener opening. Double slotted shelf standards may be used where adjacent shelves terminate.
   a. Install brackets ANSI A156.9, B04113, providing supports for shelf not over 36 inches on center and within 1/2 inch of shelf end unless shown otherwise.
   b. Install shelves on brackets so front edge is restrained by bracket.

C. Install with butt joints in straight runs and miter at corners.

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Division 7

Thermal and Moisture Protection

Division 7

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SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials and workmanship for bituminous dampproofing on concrete and masonry surfaces.

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. Product description.
2. Application instructions.

1.3 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):

D226-09.....Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

D449-03(R2008).....Asphalt Used in Dampproofing and Waterproofing

D1227-95(R2007).....Emulsified Asphalt Used as a Protective Coating for Roofing

PART 2 - PRODUCTS

2.1 ASPHALT EMULSION (COLD APPLIED):

ASTM D1227, Type III (spray grade).

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

A. Surfaces to receive dampproofing shall be clean and smooth.

B. Remove foreign matter, loose particles of mortar or other cementitious droppings.

C. Clean and wash soil or dirt particles from surface.

D. Remove free water; surfaces may remain damp.

3.2 APPLICATION:

A. Comply with Manufacturer written instructions for methods and rates of dampproofing application, cleaning and installation of any protection course.

B. Apply each coat at the rate of not less than 2-1/2 gallons per 100 square feet and allow not less than 24 hours drying time after application.

3.3 LOCATION:

A. Apply to surfaces where shown.

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SECTION 07 13 52
MODIFIED BITUMINOUS SHEET WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies modified bituminous sheet material used for exterior below grade waterproofing.

1.2 MANUFACTURER'S QUALIFICATIONS:

A. Approval by Contracting Officer is required of products and services of proposed manufacturers, and installers, and will be based upon submission by Contractor that:

1. Manufacturer regularly and presently manufactures bituminous sheet waterproofing as one of its principal products.
2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.
3. Manufacturer's product submitted has been in satisfactory and efficient operation on three similar installations for at least three years.
4. Submit list of installations, include name and location of project and name of owner.

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. Bituminous sheet.
2. Primer.
3. Mastic.
4. Protection material, temporary and permanent.
5. Printed installation instructions for conditions specified.

C. Certificates:

1. Indicating bituminous sheet manufacturer's approval of primer, and roof cement.
2. Indicating bituminous sheet waterproofing manufacturer's qualifications as specified.
3. Approval of installer by bituminous sheet manufacturers.
4. Water test report.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to job in manufacturer's original unopened container.

B. Do not store material in areas where temperature is lower than 50 degrees F, or where prolonged temperature is above 90 degrees F.

1.5 ENVIRONMENTAL REQUIREMENTS:

Ambient Surface and Material Temperature: Not less than 40 degrees F, during application of waterproofing.

1.6 WARRANTY:

Warrant bituminous sheet waterproofing installation against moisture leaks and subject to terms of "Warranty of Construction", except that warranty period is two years.

1.7 APPLICABLE PUBLICATIONS:

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

B. Federal Specifications (Fed. Spec.):

UU-B-790A.....Building Paper, Vegetable Fiber: (Kraft, Water-
INT AMD 1 Proof, Water Repellent and Fire Resistant)

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

C578-10.....Rigid Cellular Polystyrene Thermal Insulation
D41-11.....Asphalt Primer Used in Roofing, Dampproofing and Waterproofing
D2822-05.....Asphalt Roof Cement
D6380-03(R2009).....Asphalt Roll Roofing (Organic Felt)

D. American Hardboard Association (AHA):

A135.4-1995.....Basic Hardboard

PART 2 - PRODUCTS

2.1 BITUMINOUS SHEET:

A. Cold applied waterproofing membrane composed primarily of modified bituminous material prefabricated in sheet form designed for below grade exterior waterproofing. Sheet reinforced with fibers at manufacturer's option.

B. Thickness of Bituminous Sheet: 60 mils, plus or minus 5 mils, and bonded to a 4 mil thick plastic sheet.

C. Provide with a release sheet to prevent bonding of bituminous sheet to itself.

2.2 PRIMER AND ROOF CEMENT:

A. Furnished by manufacturer of bituminous sheet as required for particular application in accordance with sheet manufacturer's instructions.

B. Primer: ASTM D41.

C. Roof Cement: ASTM D4586.

2.3 PROTECTION MATERIAL:

A. Polystyrene: ASTM C578, Type I or VIII, 1/2-inch minimum thickness.

B. Hardboard: PS-58, Service Type, 1/4-inch thick.

C. Waterproofed Building Paper: Fed. Spec. UU-B-790.

D. Roll Roofing: ASTM D6380, Class S (smooth), Type III with minimum net mass per unit area of roofing, 51 lb/100 ft^2.

2.4 PATCHING COMPOUND:

A factory prepared, non-shrinking, fast setting, cementitious adhesive compound containing no ferrous metal or oxide.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Surface Condition:

1. Before applying waterproofing materials, ensure concrete and masonry surfaces are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion.
2. Fill voids, joints, and cracks with patching compound.

B. Concrete surfaces cured a minimum of seven days, free from release agents, concrete curing agents, and other contaminates.

3.2 APPLICATION:

A. Priming:

1. Prime concrete and masonry surfaces.
2. Application method, amount of primer and condition or primer before installation of bituminous sheet as recommended by primer manufacturer.
3. Reprime when required in accordance with manufacturer's instructions.

B. Bituminous Sheet Installation:

1. Remove release sheet prior to application.
2. Lay bituminous sheet from low point to high point so that laps shed water.

3. Treat expansion, construction and control joints and evident working cracks as expansion joints. Apply bituminous sheet in double thickness over joint by first applying a strip of bituminous sheet not less than 8 inches wide, centered over joint.
4. Lap seams not less than 2 inches.
5. Lay succeeding sheet with laps, and roll or press into place.
6. Repair misaligned or inadequately lapped seams in accordance with manufacturer's instructions.
7. Seal seams and terminations in accordance with sheet manufacturer's instructions.

C. Corner Treatment:
1. At inside and outside corners apply double cover using an initial strip not less than 11 inches wide, centered along axis of corner.
2. Cover each strip completely by the regular application of bituminous sheet.
3. Provide a fillet or cant on inside corners.
4. Form cants using patching compound
5. Do not use wood, fiber, and insulating materials for cants.

D. Projection Treatment:
1. Apply a double layer of bituminous sheet around pipes and similar projections at least 6 inches wide.
2. At drains, apply a bead of roof cement over a double layer of bituminous sheet under clamping rings.

3.3 PROTECTION:

A. Protect bituminous sheet before backfill or wearing courses are placed.

B. Install protection material and hold in place in accordance with instructions of manufacturer of waterproofing materials.

C. Permanent Protection:
1. Vertical Surfaces:
a. Install hardboard, polystyrene, or roll roofing protection material.
b. Extend protection full height from footing to top of backfill.
c. If graded backfill is used, use roll roofing or hardboard.

D. Temporary Protection:
When waterproofing materials are subjected to damage by sunlight and can not be immediately protected as specified, protect waterproofing

materials by waterproof building paper or suitable coating approved by manufacturer of waterproofing system used.

3.4 PATCHING:

Repair tears, punctures, air blisters, and inadequately lapped seams, in accordance with manufacturer's instructions before protection course is applied.

3.5 TESTING:

A. Before any protection or wearing course is applied, test all horizontal applications of waterproofing with a minimum of 1-inch head of water above highest point and leave for 24 hours.

B. Mark leaks and repair when waterproofing is dry.

C. Certify, to Project Manager, that water tests have been made and that areas tested were found watertight.

3.6 INSPECTION:

Do not cover waterproofed surfaces by other materials or backfill until work is approved by Project Manager.

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SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies thermal and acoustical insulation for buildings.

B. Acoustical insulation is identified by thickness and words "Acoustical Insulation".

1.2 RELATED WORK

A. Foamed-in-place insulation at exterior walls: Section 07 21 19, FOAMED-IN-PLACE INSULATION.

B. Insulation for insulated wall panels: Section 07 22 00, ROOF AND DECK INSULATION.

C. Insulation in connection with roofing and waterproofing: Section 07 22 00, ROOF AND DECK INSULATION.

D. Safing insulation: Section 07 84 00, FIRESTOPPING.

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. Insulation, each type used
2. Adhesive, each type used.
3. Tape

C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.4 STORAGE AND HANDLING:

A. Store insulation materials in weathertight enclosure.

B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

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):

C270-10.....Mortar for Unit Masonry

C552-07.....Cellular Glass Thermal Insulation.

C553-08.....Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

C578-10.....Rigid, Cellular Polystyrene Thermal Insulation
C591-09.....Unfaced Preformed Rigid Cellular Polyisocynurate Thermal Insulation
C665-06.....Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
C728-05 (R2010).....Perlite Thermal Insulation Board
C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness
C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
D312-00(R2006).....Asphalt Used in Roofing
E84-10.....Surface Burning Characteristics of Building Materials
F1667-11.....Driven Fasteners: Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 INSULATION – GENERAL:

A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.

B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.

C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.

D. Insulation Products shall comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Perlite composite board	23 percent post consumer recovered paper
Polyisocyanurate/polyurethane	
Rigid foam	9 percent recovered material
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material
Phenolic rigid foam	5 percent recovered material
Rock wool material	75 percent recovered material

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

2.2 MASONRY CAVITY WALL INSULATION:

A. Polyisocyanurate Board: ASTM C591, Type I.

2.3 PERIMETER INSULATION IN CONTACT WITH SOIL:

A. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX where covered by soil or concrete.

2.4 EXTERIOR FRAMING OR FURRING INSULATION:

A. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.

2.5 ACOUSTICAL INSULATION:

A. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.

B. Thickness as shown; of widths and lengths to fit tight against framing.

2.6 RIGID INSULATION:

A. On the outside face of exterior walls, spandrel beams, floors, bottom of slabs, and where shown.

B. Mineral Fiber Board: ASTM C612, Type IB or 2.

C. Perlite Board: ASTM C728.

D. Cellular Glass Block: ASTM C552, Type I.

2.7 FASTENERS:

A. Staples or Nails: ASTM F1667, zinc-coated, size and type best suited for purpose.

B. Screws: ASTM C954 or C1002, size and length best suited for purpose with washer not less than 50 mm (two inches) in diameter.

C. Impaling Pins: Steel pins with head not less than 50 mm (two inches) in diameter with adhesive for anchorage to substrate. Provide impaling pins of length to extend beyond insulation and retain cap washer when washer is placed on the pin.

2.8 ADHESIVE:

A. As recommended by the manufacturer of the insulation.

2.9 TAPE:

A. Pressure sensitive adhesive on one face.

B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.

B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.

C. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 MASONRY CAVITY WALLS:

A. Mount insulation on exterior faces of inner wythes of masonry cavity walls and brick faced concrete walls. Fill joints with same material used for bonding.

B. Bond polyisocyanurate board, to surfaces with adhesive as recommended by insulation manufacturer.

3.3 PERIMETER INSULATION:

A. Vertical insulation:

1. Fill joints of insulation with same material used for bonding.
2. Bond polystyrene board to surfaces with adhesive mixed and applied in accordance with recommendations of insulation manufacturer.
3. Bond cellular glass insulation to surfaces with adhesive cement.

3.4 RIGID INSULATION ON SURFACE OF EXTERIOR WALLS, FLOORS, AND UNDERSIDE OF FLOORS:

A. On the exterior face of concrete walls, beams, beam soffits, underside of floors, and to the face of studs for interior wall finish where shown.

B. Bond to solid vertical surfaces with adhesive as recommended by insulation manufacturer. Fill joints with adhesive cement.

C. Use impaling pins for attachment to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.

D. Fasten board insulation to face of studs with screws. Space fastenings not more than 12 inches apart. Stagger fasteners at joints of boards. Install at each corner.

3.5 ACOUSTICAL INSULATION:

A. Fasten blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.

B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.

C. Do not compress insulation below required thickness except where embedded items prevent required thickness.

D. Where acoustical insulation is installed above suspended ceilings install blanket at right angles to the main runners or framing. Extend insulation over wall insulation systems not extending to structure above.

E. Where semirigid insulation is used which is not full thickness of cavity, adhere to one side of cavity maintaining continuity of insulation and covering penetrations or embedments in insulation.

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SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents, including Division 1 General Requirements, apply to the work of this section.

1.2 SUMMARY

A. This Section describes the requirements to provide labor, equipment and materials for installation and application of foamed-in-place insulation to provide thermal insulation and an air barrier.

1.3 SUBMITTALS

A. Certifications:
   1. Manufacturer’s years of experience in manufacture of materials of this Section.
   2. Copy of Applicator current certificate issued by manufacturer.
   3. Certification that products provided, meet or exceed requirements of this project Specification.

B. Data:
   1. Product Data, describing insulation properties, surface burning characteristics, air and moisture vapor permeance.
   2. Samples: Include representative samples of the following for approval:
      a. Cured Insulation Material
      b. Transition membrane to be used for control and expansion joints
      c. Sealant to be used in conjunction with foamed in place insulation
   3. Manufacturer’s Installation Instructions.
   4. Shop Drawings: Submit shop drawings showing locations and details of all typical conditions, intersections with other envelope assemblies and materials, window and door openings, and details showing how gaps in the construction will be bridged, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed. Indicate special joint or termination conditions and conditions of interface with adjacent materials.
   5. Warranty: Submit manufacturer warranty and ensure forms have been completed in the Owner’s name and registered with the manufacturer.

6. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.

1.4 QUALITY ASSURANCE

A. Manufacturer: Material manufacturer shall be a company specializing in the manufacture of foamed-in-place insulation for a period of a minimum 5 years.

B. Installer Qualifications:

1. Company specializing is performing the work of this section, which has at least 2 years experience applying the material on projects of similar size and scope.
2. The Applicator shall be currently certified to apply materials of this Section by the material manufacturer.

C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.

D. Pre-Installation Conference: A pre-installation conference shall be held two weeks prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for the meeting shall include but not be limited to the following:

1. Requirements for inspection and verification
2. Review of submittals.
3. Review of surface preparation, minimum curing period and installation procedures.
4. Review of special details and flashings.
5. Sequence of construction, responsibilities and schedule for subsequent operations.
6. Review of mock-up requirements.
7. Review of inspection, testing, protection and repair procedures.

1.5 MOCK-UP

A. Construct mock-up of 100 sq ft of vertical insulated panel; to represent finished work including designed framing and substrates, with inside and outside corners. May remain as part of Work.

B. Locate where directed by Project Manager.

1.6 ENVIRONMENTALS

A. Toxicity/Hazardous Materials—Out-Gasing/Reactivity

1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
2. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing or installation process will not be permitted.

1.7 DELIVERY, STORAGE AND HANDLING

A. Observe all safety precautions and handling instructions on Material Safety Data Sheets for products.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

C. Store materials in a dry area protected from precipitation, freezing and overheating, at temperatures not lower than 60 F or above 90 F.

D. Protect materials during handling and application to prevent damage and contamination.

1.8 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive foamed in place insulation.

1.9 WARRANTY

A. Provide written material warranty issued by the material manufacturer upon completion of the work.

B. Contractor shall correct defective work within a two year period after date of substantial completion, remove and replace materials concealing waterproofing at no extra cost to the Owner.

PART 2 — PRODUCTS

2.1 MATERIALS

A. Basis of Design: BASF "Spraytite" 178® Insulation, a two-component, closed-cell, rigid foam plastic insulation as manufactured by:

BASF Corporation
13630 Watertower Circle
Minneapolis, MN. 55441
(888)900-3626

B. Spray foam closed cell insulation shall be a spray-applied rigid, low-density, air impenetrable cellular polyurethane foam plastic insulation produced in the field by combining a part A polymeric isocyanurate component with a part B resin-based component. The material shall be job-site mixed in and spray applied by and through equipment designed especially for this purpose.

C. Approved alternates:

1. HEATLOK Soy Manufactured by
   Demilec (USA) LLC
   2925 Galleria Drive
   Arlington, TX 76011
   Phone: (877-DEMILEC

D. Minimum performance criteria: Material used must meet the following minimum performance criteria:

TEST STANDARD	DESCRIPTION	VALUE
ASTM C518-02	1″ nominal 2″ nominal 3″ nominal 3.5″ nominal 5″ nominal 7″ nominal 8″ nominal	R – 6.7 R – 13 R – 20 R – 24 R – 34 R – 48 R – 55
ASTM D2856	Closed Cell Content	>90%
ASTM D1622	Core Density (nominal)	1.7 lbs/ft^3
ASTM D1623	Tensile Strength	19 p.s.i.
ASTM D1621	Compressive Strength	23 p.s.i.
ASTM C1338	Criteria for Fungi Resistance	Pass
ASTM E84-04	Surface Burning Characteristics Flame Spread Smoke Development Index	1.625″ <25 <450
ASTM D2126-04	Dimensional Stability 82°C, Ambient Humidity	Less than

	23°C, 50% Relative Humidity -20°C, Ambient Humidity	1% Less than 1% Less than 1%
ASTM E96	Water Vapor Permeability 1" Thick Foam 2.5" Thick Foam	 2.06 perms 0.73 perms
ASTM D2842-01	Water Absorption	0.2%

PART 3 — EXECUTION

3.1 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

B. Verify that all rough-ins for electric and plumbing or other work on and within spaces to be insulated is complete prior to application.

3.2 PREPARATION OF SUBSTRATES

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.

B. Mask and protect adjacent surfaces from overspray or damage.

C. Prepare all substrates scheduled or intended to receive material in accordance with manufacturer's written instructions.

1. Prepare all surfaces to receive spray foam application.
2. Properly seal all areas that require sealant to insure a proper air seal when complete.
3. Properly mask all windows, doors and areas to be protected from overspray.
4. Protect floors and drywall areas from overspray.

D. Application of materials by spray foam contractor shall constitute acceptance of job-site conditions and substrates and therefore negate future claims of insulation failures due to those conditions or substrates.

3.3 APPLICATION

A. Apply insulation in accordance with manufacturer's written application instructions.
   1. Insure all equipment is clean and ready for spraying foam using safety guidelines as offered by the Spray Foam Insulation Association.
   2. Turn on equipment and set temperature and pressure settings as required.
   3. Spray foam to specified thickness.
   4. Trim foam as necessary to framed wall thickness when filling cavity.

B. Apply insulation to a reasonably uniform monolithic density without voids, at minimum cured thickness as specified in the architectural drawings.

3.4 FIELD QUALITY CONTROL

A. Inspect application for proper density and thickness of insulation upon completion.

B. Do not cover installed insulation until required inspections have been completed by the Owner's Agent.

3.5 PROTECTION

A. Do not permit subsequent work to disturb applied insulation.

B. Any "hot work" repairs such as welding or soldering etc. must follow appropriate standards and practices (such as "fire watch") to prevent fire. Refer to Supplementary Condition Article 10 for procedures.

C. Exposed foam must be covered with wall board as soon as possible. Insulation shall be separated from the interior of the building by 5/8" gypsum board or equivalent approved 15 minute thermal barrier.

3.6 CLEANING

A. Upon completion of operations of this Section, remove all masking, trim excess material that may prevent final installation of other materials and remove all overspray that may be on adjacent surfaces.

B. Clean all floor surfaces of set materials from resultant final trimming.

C. Remove from the project site all refuse, cartons and other waste resultant from work of this Section of Specifications.

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SECTION 07 22 00
ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Roof and deck insulation, substrate board, vapor retarder, and cover board on new construction ready to receive roofing or waterproofing membrane.

B. Repairs and alteration work to existing roof insulation.

1.2 RELATED WORK

A. General sustainable design documentation requirements: Section 01 81 11 SUSTAINABLE DESIGN REQUIREMENTS.

B. Wood cants, blocking, and edge strips: Section 06 10 00, ROUGH CARPENTRY.

C. Perimeter, rigid, and batt or blanket insulation not part of roofing system: Section 07 21 13, THERMAL INSULATION.

D. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 APPLICABLE PUBLICATIONS

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

B. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):

90.1-07.....Energy Standard for Buildings Except Low-Rise Residential Buildings

C. ASTM International (ASTM):

C208-08.....Cellulosic Fiber Insulating Board

C552-07.....Cellular Glass Thermal Insulation

C726-05.....Mineral Fiber Roof Insulation Board

C728-05.....Perlite Thermal Insulation Board

C1177/C1177M-08.....Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C1278/C1278M-07.....Standard Specification for Fiber-Reinforced Gypsum Panel

C1289-10.....Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

C1396/C1396M-09.....Standard Specification for Gypsum Board

D41-05.....Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

D312-06.....Asphalt Used in Roofing

D1970-09.....Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

D2178-04.....Asphalt Glass Felt Used in Roofing and Waterproofing

D2822-05.....Asphalt Roof Cement

D4586-07.....Standard Specification for Asphalt Roof Cement, Asbestos-Free

E84-09.....Standard Test Method for Surface Burning Characteristics of Building Material

F1667-05.....Driven Fasteners: Nails, Spikes, and Staples

D. FM Approvals: RoofNav Approved Roofing Assemblies and Products.

4450-89.....Approved Standard for Class 1 Insulated Steel Deck Roofs

4470-10.....Approved Standard for Class 1 Roof Coverings

1-28-09.....Loss Prevention Data Sheet: Design Wind Loads.

1-29-09.....Loss Prevention Data Sheet: Above-Deck Roof Components

1-49-09.....Loss Prevention Data Sheet: Perimeter Flashing

E. National Roofing Contractors Association: Roofing and Waterproofing Manual

F. U.S. Department of Agriculture (USDA): USDA BioPreferred Catalog, www.biopreferred.gov

G. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory (2009)

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

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Performance: Provide roof insulation meeting minimum overall average R-value of 33, with minimum R-value at any location of 10.

B. FM Approvals: Provide roof insulation complying with requirements in FM Approvals 4450 and 4470 as part of specified roofing system, listed in FM Approvals "RoofNav" as part of roofing system meeting Fire/Windstorm Classification in Division 07 roofing section.

1.5 QUALITY CONTROL

A. Requirements of Division 07 roofing section for qualifications of roofing system insulation Installer; Work of this Section shall be performed by same Installer.

B. Requirements of Division 07 roofing section for inspection of Work of this Section and qualifications of Inspector.

C. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.

D. Requirements of roofing system uplift pressure design for specified roofing system.

E. Requirements of applicable FM Approval for specified roofing system insulation attachment.

F. Bio-Based Materials: Where applicable, provide products designated by USDA and meeting or exceeding USDA recommendations for bio-based content, and products meeting Rapidly Renewable Materials and certified sustainable wood content definitions; refer to www.biopreferred.gov.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data:

1. Asphalt and adhesive materials, each type.
2. Roofing cement, each type.
3. Roof insulation, each type.
4. Substrate board, each type.
5. Cover board, each type.
6. Fastening requirements.
7. Insulation span data for flutes of metal decks.

C. Federal Sustainable Design Submittals:

1. Product Data for Federally-Mandated Bio-Based Materials: For roof materials, indicating USDA designation and compliance with

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

D. Shop Drawings: Include plans, sections, details, and attachments.
   1. Nailers, cants, and terminations.
   2. Layout of insulation showing slopes, tapers, penetration, and edge conditions.

E. Samples:
   1. Roof insulation, each type.
   2. Nails and fasteners, each type.

F. Certificates:
   1. Indicating type, thermal conductance, and minimum and average thickness of insulation.
   2. Indicating materials and method of application of insulation system meet the requirements of FM Approvals for specified roofing system.

G. Laboratory Test Reports: Thermal values of insulation products.

H. Layout of tapered roof system showing units required.

I. Documentation of supervisors' and inspectors' qualifications.

1.7 DELIVERY, STORAGE AND MARKING

A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to built-up roofing for storage, handling and installation requirements.

1.8 QUALITY ASSURANCE:

A. 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 E84, or shall have successfully passed FM Approvals 4450.
   1. 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.
   2. 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 particular 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 Approvals "RoofNav."

3. 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 ADHESIVE MATERIALS

A. Adhesive Materials, General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.
   1. Liquid-type adhesive materials shall comply with VOC limits of authorities having jurisdiction.
   2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Plastic Foam Adhesives: 50 g/L.
      b. Multipurpose Construction Adhesives: 70 g/L.
      c. Fiberglass Adhesives: 80 g/L.
      d. Contact Adhesives: 80 g/L.
      e. Other Adhesives: 250 g/L.
      f. Nonmembrane Roof Sealants: 300 g/L.
      g. Sealant Primers for Nonporous Substrates: 250 g/L.
      h. Sealant Primers for Porous Substrates: 775 g/L.
B. Primer: ASTM D41.
C. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.
D. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
E. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
F. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

G. Roof Cement: Asbestos free, ASTM D2822, Type I or Type II,; or, D4586, Type I or Type II.

2.2 ROOF AND DECK INSULATION

A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer and listed as component of FM Approvals-approved roofing system.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

C. Perlite Board Insulation: ASTM C728, expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.

D. Tapered Roof Insulation System:

1. Fabricate of mineral fiberboard, polyisocyanurate, perlite board, or cellular glass. Use only one insulation material for tapered sections. Use only factory-tapered insulation.
2. Cut to provide high and low points with crickets and slopes as shown.
3. Minimum thickness of tapered sections; 38 mm (1-1/2 inch).
4. Minimum slope 1:48 (1/4 inch per 12 inches).

2.3 INSULATION ACCESSORIES

A. Cants and Tapered Edge Strips:

1. Wood Cant Strips: Refer to Division 06 Section "Rough Carpentry."
2. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
3. Tapered Edge Strips: 1:12 (one inch per foot), from 0 inches, 12 inches to 18 inches wide.
   a. Cellulosic Fiberboard: ASTM C208.
   b. Mineral Fiberboard: ASTM C726.
   c. Perlite Board: ASTM C728.

B. Substrate Board:

1. Glass-mat, water-resistant gypsum substrate, ASTM C1177/C1177M, Type X, 5/8 inch thick, factory primed.

C. Cover Board:

1. Glass-mat, water-resistant gypsum substrate, ASTM C1177/C1177M, 1/2 inch thick, factory primed.

D. Vapor Retarder:

1. Glass-Fiber Felts: ASTM D2178, Type IV, asphalt impregnated.

2. Self-Adhering Sheet Vapor Retarder: ASTM D1970, minimum of 1.0-mm- (40-mil-) thick, polyethylene film laminated to layer of rubberized asphalt adhesive, or 0.76- to 1.0-mm- (30- to 40-mil-) thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of 6 ng/Pa x s x sq. m (0.1 perm).

2.4 FASTENERS

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with FM Approvals 4470, designed for fastening substrate board to roof deck.

B. Staples and Nails: ASTM F1667. Type as designated for item anchored and for substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with requirements of Division 07 roofing section.

3.2 PREPARATION

A. Comply with requirements of Division 07 roofing section.

3.3 SUBSTRATE BOARD INSTALLATION

A. Fasten substrate board to top flanges of steel deck to resist uplift pressures according to roofing system manufacturers instructions and requirements of FM Approvals listing for specified roofing system.

3.4 VAPOR RETARDER INSTALLATION

A. General:

1. Install continuous vapor retarder on roof decks.
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. Seal penetrations with roof cement.

3.5 RIGID INSULATION INSTALLATION

A. Insulation Installation, General:

1. Install roof insulation in accordance with roofing system manufacturer's written instructions.

2. Install roof insulation in accordance with requirements of FM Approval's Listing for specified roofing system.
3. Base Sheet: Where required by roofing system, install one lapped base sheet specified in Division 07 roofing section by mechanically fastening to roofing substrate prior to installation of insulation.
4. Cant Strips: Install wood cant strips specified in Division 06 Section ROUGH CARPENTRY at junctures of roofing system with vertical construction.

B. Insulation Thickness:
1. Thickness of roof insulation shown on drawings is nominal. Actual thickness shall provide the average thermal resistance "R" value of not less than that specified in Performance Requirements Article.
2. 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.
3. 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 1-1/2 inches.
4. Use not less than two layers of insulation when insulation is 2.7 inch or more in thickness unless specified otherwise. Stagger joints minimum 6 inches.

C. 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.

D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.

E. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.

F. Cut to fit tight against blocking or penetrations.

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

H. Installation Method:
1. Adhered Insulation:
a. Prime substrate as required.

b. Set each layer of insulation firmly in uniform application of full-spread insulation adhesive.

2. Cover Board: Install cover boards over insulation with long joints in continuous straight lines with staggered end joints. Offset cover board joints from insulation joints minimum 6 inches. Fasten cover boards according to "Adhered Insulation" requirements.

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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 Exterior Insulation and Finish System (EIFS) which is applied over cement board sheathing.

1.2 RELATED WORK

A. Cement Board: Section 06 16 63, CEMENTITIOUS SHEATHING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:
Two 300 mm (one-foot) square samples of the EIFS finishes over insulation.

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, soffits, 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.

1.4 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.

1.5 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.

1.6 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", except that the warranty period shall be ten years.

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):

B117-09.....Operating Salt Spray (Fog) Apparatus

C67-09.....Sampling and Testing Brick and Structural Clay Tile

C177-10.....Steady-State Heat Flux measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C297-10.....Flatwise Tensile Strength of Sandwich Constructions

C578-10.....Rigid, Cellular Polystyrene Thermal Insulation

C666-03(R2008).....Resistance of Concrete to Rapid Freezing and Thawing

C920-11.....Elastomeric Joint Sealants

D968-10.....Abrasion Resistance of Organic Coatings by Falling Abrasive

D2794-93(R2010).....Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

E84-10.....Surface Burning Characteristics of Building Materials

E96-10.....Water Vapor Transmission of Materials

E108-10.....Fire Tests of Roof Coverings

E330-02(R2010).....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

G90-10.....Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight

C. Exterior Insulation Manufacturers Association (EIMA)

101.86-1992.....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
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-14) 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 2 inches in 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.

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. 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. Adhesive: Apply directly to entire back surface of the insulation board as recommended by the system manufacturer and immediately apply to cement board substrate. Apply firm pressure over entire board to ensure uniform contact and level surface. Allow adhesive to cure for a minimum of 24 hours before sanding.
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 27 27
FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR RETARDING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies fluid-applied vapor-retarding membrane air barrier material and accessories used for exterior above grade wall assembly air barriers and their extension and connection to adjacent air barrier components in roof and opening construction to provide a durable, continuous, air- and moisture- impermeable full-building system.

1.2 RELATED WORK

A. General quality assurance and quality control requirements: Section 01 45 29 TESTING LABORATORY SERVICES.

B. General sustainable design documentation requirements: Section 01 81 11 SUSTAINABLE DESIGN REQUIREMENTS.

C. Masonry units serving as substrate for membrane air barriers, including preparation of surface: Section 04 20 00 UNIT MASONRY.

D. Flashing components of factory finished roofing and wall systems to which membrane air barriers will transition: Division 07 roofing and wall system sections.

E. Other flashing components to which membrane air barriers will transition: Section 07 60 00 FLASHING AND SHEET METAL.

F. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

G. Division 08 exterior openings sections for opening transitions providing airtight seal between membrane air barrier and all openings.

H. Wall sheathings serving as substrate for membrane air barriers: Section 06 16 63 CEMENTITIOUS SHEATHING.

1.3 APPLICABLE PUBLICATIONS

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

1. 1. Air Barrier Association of America (ABAA): Quality Assurance Program

2. American Society of Testing and Materials (ASTM):

C920-10.....Standard Specification for Elastomeric Joint Sealants

C1193-09.....Standard Guide for Use of Joint Sealants

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

D2369-10.....Standard Test Method for Volatile Content of Coatings

E96/E96M-05.....Standard Test Methods for Water Vapor Transmission of Materials

E162-09.....Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

E783-02.....Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

E1186-03(2009).....Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems

E2178-03.....Standard Test Method for Air Permeance of Building Materials

E2357-05.....Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

3. U.S. Environmental Protection Agency (EPA):

40 CFR 59, Subpart D....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

4. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD):

1168-89(2003).....Adhesive and Sealant Applications

1.4 PERFORMANCE REQUIREMENTS

A. General: Membrane air barrier shall be capable of performing as a continuous vapor-impermeable air barrier and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Membrane air barriers shall accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

B. Air-Barrier Assembly Air Leakage: Maximum 0.2 L/s x sq. m of surface area at 75 Pa (0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft.)per ASTM E 2357.

C.

D. Material Compatibility: Provide membrane air barrier materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by membrane air barrier manufacturer based on testing and field experience.

1.5 QUALIFICATIONS:

A. Approvals: Approval by Contracting Officer is required of products and services of proposed manufacturers, and installers, and will be based upon submission by Contractor that:

B. Manufacturer Qualifications: Manufacturer regularly and presently manufactures fluid-applied membrane air barrier material meeting section requirements as one of its principal products.

1. Manufacturer's product submitted has been in satisfactory and efficient operation on five similar installations for at least five years.
   a. Submit list of installations, include name and location of project and name of owner.
2. Accreditation: Manufacturer is accredited by the Air Barrier Association of America.

C. Installer Qualifications: Installer has technical qualifications, experience, certifications, trained personnel, membrane air barrier manufacturer's approval, and facilities to install specified items.

1. Accreditation: Installer shall be accredited by the Air Barrier Association of America (ABAA) and whose installers are certified in accordance with the site Quality Assurance Program used by ABAA.
2. Installer's applicators shall be trained and certified by manufacturer of air barrier system.
3. Installer's full time on-site field supervisor shall have completed three projects of similar scope within last year, be able to communicate verbally with Contractor, Architect, testing agency, and employees.
   a. Accreditation: Installer's supervisor shall be a Level 3 Accredited Installer by the ABAA.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Fluid-applied membrane air barrier.
2. Primer.
3. Mastic.
4. Counterflashing strip.
5. Opening transition assembly.
6. Joint sealant.
7. Printed installation instructions for conditions specified.

C. Certificates:
1. Indicating membrane air barrier manufacturer's qualifications as specified.
2. Indicating approval of installer by membrane air barrier manufacturer.
3. Indicating qualifications of installer and installer's personnel.
4. Indicating air barrier manufacturer's determination that proposed materials are chemically and adhesively compatible with adjacent materials.
5. Indicating products meet project limitations on VOC content.

D. Inspection Reports: Daily reports of testing agency and reports of testing and inspection agency. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.7 COORDINATION:

A. Coordinate installation of work of this Section with adjacent and related work to ensure provision of continuous, unbroken, durable air barrier system.

B. Installation Audit: Incorporate audit requirements of ABAA QAP. Coordinate and cooperate with ABAA auditors. Ensure air barrier assembly remains exposed to facilitate inspection, testing, and correction activities.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to job in manufacturer's original unopened containers.

B. Do not store material in areas where temperature is lower than 10 degrees C (50 degrees F,) or where prolonged temperature is above 32 degrees C (90 degrees F).

1.9 ENVIRONMENTAL REQUIREMENTS:

Ambient Surface and Material Conditions: Not less than 4 degrees C (40 degrees F), during application of waterproofing, visibly dry, and complying with manufacturer's written instructions.

1.10 WARRANTY:

Warrant membrane air barrier installation against air and moisture leaks subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period is two years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain membrane air barrier materials and accessories from single manufacturer.

B. VOC Content: Maximum 250 g/L per 40 CFR 59, Subpart D (EPA Method 24).

2.2 MEMBRANE AIR BARRIER:

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane, meeting the following:

1. Air Permeance, ASTM E 2178: 0.02 L/s x sq. m of surface area at 75-Pa (0.004 cfm/sq. ft of surface area at 1.57-lbf/sq. ft.)pressure difference.
2. Vapor Permeance, ASTM E 96/E96M: Maximum 5.8 ng/Pa x s x sq. m (0.1 perm).
3. Elongation, Ultimate, ASTM D 412, Die C: 500 percent, minimum.
4. Combustion Characteristics: Flame spread, not greater than 25; smoke developed, not greater than 450, ASTM E 84.
5. Thickness of Membrane Air Barrier: Not less than 1.0 mm (40 mils)dry film thickness, applied in single continuous coat.

2.3 ACCESSORY MATERIALS:

A. Primer: Liquid waterborne primer meeting VOC requirements, recommended for substrate by membrane air barrier manufacturer.

B. Counterflashing Sheet: Modified bituminous, minimum 1.0-mm- (40-mil-thick self-adhering composite sheet consisting of minimum 0.8 mm (32 mils) of rubberized asphalt laminated to polyethylene film.

C. Substrate Patching Material: Manufacturer's standard trowel-grade filler material.

D. Sprayed Polyurethane Foam Sealant: Foamed-in-place, 24- to 32-kg.cu. m (1.5- to 2.0-lb/cu. ft) density, with flame-spread index of 25 or less per ASTM E 162.

E. Flexible Opening Transition: Cured low-modulus silicone extrusion with reinforcing ribs, sized to fit opening widths, designed for adhesion to or insertion into aluminum framing extrusions, and compatible with air barrier system materials and accessories.

F. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, approved by membrane air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Surface Condition: Before applying membrane air barrier materials, ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion.

B. Verify concrete surfaces have cured for time period recommended by membrane air barrier manufacturer, free from release agents, concrete curing agents, and other contaminates.

C. Verify masonry joints are flush and filled with mortar.

3.2 INTERFACE WITH OTHER WORK

A. Commencement of Work: Commence work once membrane air barrier substrates are adequately protected from weather and will remain protected during remainder of construction.

B. Sequencing of Work: Coordinate sequencing of work with work of other sections that form portions of building envelope air barrier to ensure that flashings and transition materials can be properly installed.

C. Subsequent Work: Coordinate work with work of other sections installed subsequent to membrane air barrier to ensure complete inspection of installed membrane air barrier and sealing of membrane air barrier penetrations necessitated by subsequent work.

3.3 AIR BARRIER INSTALLATION

A. General: Prepare substrates and install and apply air barrier components in accordance with air barrier manufacturer's written instructions consistent with manufacturer's qualifying tested assemblies.

1. Compliance: Prepare substrates and install and apply air barrier components in accordance with requirements of ABAA QAP.

3.4 PREPARATION

A. Prepare and treat substrate in accordance with membrane air barrier manufacturer's written instructions.

B. Mask adjacent finished surfaces.

C. Remove contaminants and film-forming coatings from concrete.

D. Remove projections and excess materials and fill voids with substrate patching material.

E. Prepare and treat joints and cracks in substrate per ASTM C 1193 and membrane air barrier manufacturer's written instructions.

F. Apply primer to substrates.

3.5 APPLICATION OF TRANSITION STRIPS

A. Install transition strips and accessory materials according to membrane air barrier manufacturer's written instructions.

B. Connect and seal membrane air barrier material to adjacent components of building air barrier system, including, but not limited to, roofing system air barrier, exterior glazing and window systems, curtain wall systems, door framing, and other openings.

C. Flexible Opening Transition: Prime concealed perimeter frame surfaces of windows, storefronts, curtain walls, louvers, and doors. Apply flexible opening transition and attach or adhere in accordance with air barrier manufacturer's written instructions.

1. Fill gaps at perimeter of openings with foam sealant.

D. Penetrations: Fill gaps at perimeter of penetrations with foam sealant. Seal transition strips around penetrating objects with termination mastic.

E. Flashings: Seal top of through-wall flashings to membrane air barrier with continuous transitions strip of type recommended by membrane air barrier manufacturer for type of flashing.

3.6 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. Apply fluid membrane air barrier material in full contact with substrate to produce a continuous seal with transition strips according to membrane air barrier manufacturers written instructions.

1. Apply fluid membrane in thickness recommended by manufacturer, but not less than thickness specified in this section.

B. Leave membrane air barrier exposed until tested and inspected by Owner's testing agency and approved by Project Manager.

C. Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.7 TESTING:

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections, including documenting of membrane air barrier prior to concealment.

1. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements, including the following:
2. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
3. Continuous structural support of air-barrier system has been provided.
4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
5. Site conditions for application temperature and dryness of substrates have been maintained.
6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.
15. Inspections and testing shall be carried out at the following rate:
    a. Up to 10,000 square feet (930 square meters) - one inspection

b. 10,001 - 35,000 square feet (931 - 3,250 square meters) - two inspections
c. 35,001 - 75,000 square feet (3,251 - 6,970 square meters) - three inspections
d. 75,001 - 125,000 square feet (6,971 - 11,610 square meters) - four inspections
e. 125,001 - 200,000 square feet (11,611 - 18,580 square meters) - five inspections
f. Over 200,00 square feet (18,580 square meters) - six inspections.

16. Forward written inspection reports to the Project Manager within 5 working days of the inspection and test being performed.
17. If the inspections reveal any defects, promptly remove and replace defective work at no additional cost to the Owner.

B. Inspections shall include:
1. Compatibility of materials within membrane air barrier system and with adjacent materials.
2. Suitability of substrate and support for membrane air barrier materials.
3. Suitability of conditions under which membrane air barrier will be applied.
4. Adequacy of substrate priming.
5. Proper application and joint and edge treatment of transition strips, flexible opening transitions, and accessory materials.
6. Continuity and gap-free installation of membrane air barrier, transition strips, and accessory materials.

C. Audit: Provide installer audit by ABAA. Coordinate scheduling of work and associated audit inspections. Cooperate with ABAA’s testing agency. Allow access to work areas and staging. Notify ABAA in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted. Arrange and pay for site inspections by ABAA to verify conformance with the manufacturer’s instructions, the site Quality Assurance Program used by ABAA, and this section of the project specification.

3.8 CLEANING AND PROTECTION

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect membrane air barrier from damage from subsequent work. Protect membrane materials from exposure to UV light in excess of that acceptable to membrane air barrier manufacturer; replace overexposed materials and retest.

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SECTION 07 42 19
METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal plate wall panels.

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal wall panels.
2. Division 07 Section "Flashing and Sheet Metal" for field-formed flashings and other sheet metal work not part of metal wall panel assemblies.

1.3 DEFINITION

A. Metal Plate Wall Panel Assembly: Metal plate wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system based on AAMA-CW-RS-1-04 The Rain Screen Principle and Pressure Equalized Wall Design.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal plate wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction. Design, fabricate, and erect a pressure equalized “rainscreen” aluminum wall panel system to meet the requirements of AAMA 508-7 Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems without the use of sealants or caulks specified as follows:

B. Delegated Design: Design metal plate wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested at 6.24 psf according to ASTM E 283 at the following test-pressure difference:

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
   1. At a difference of 10% of inward acting design load, 15.00 psf min. after 15 minutes.

E. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12 lbf/sq. ft. (575 Pa).

F. Structural Performance: Provide metal plate wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
   1. Wind Loads: Determine loads based on the following minimum design wind pressures:
      a. Uniform pressure of 30 lbf/sq. ft., acting inward or outward.
      b. Uniform pressure with 90 mph wind speed.
   2. Deflection Limits: Metal plate wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

H. Pressure Equalization: ASTM E1233 Cyclic Static Air Pressure Differential Testing; Positive pressure loading to 25 psf for 100 three second cycles.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal plate wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal plate wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.
   1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
      a. Flashing and trim.
      b. Anchorage systems.
      c. Manufacturer's standard extrusions.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Metal Plate Wall Panels: 2" x 3" Sample Chips. Include fasteners, closures, and other panel accessories.

D. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Metal plate wall panels and attachments.
   2. Stud framing.
   3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
   4. Penetrations of wall by pipes and utilities.

E. Qualification Data: For Installer, professional engineer and testing agency.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

G. Maintenance Data: For metal plate wall panels to include in maintenance manuals.

H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of metal plate wall panel from single source from single manufacturer.
   1. Company specializing in performing the work of this Section shall install the system in strict compliance with the written "Installation Guide."

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, metal plate wall panel Installer, metal plate wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects panels including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal plate wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal plate wall panels.
6. Review temporary protection requirements for metal plate wall panel assembly during and after installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal plate wall panels, and other manufactured items so as not to be damaged or deformed. Package panels for protection during transportation and handling. Store and handle in strict compliance with manufacturer’s instructions and recommendations. Protect from weather, excessive temperatures and construction operations.

B. Unload, store, and erect metal plate wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal plate wall panels vertically on platforms or pallets, covered with suitable weathertight and ventilated covering. Store panels to ensure dryness, with positive slope for drainage of water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage. Always store vertically with top of panel down.

D. Retain strippable protective covering on metal plate wall panel for period of installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal plate wall panels to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal plate wall panel fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate metal plate wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal plate wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.

b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal plate wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in strict adherence to Manufacturer's "Design Guide" for Basis of Design: "Dri-Design Wall Panel System" of 3003-H14 Aluminum. Thickness shall be 0.080" per the requirements of the project or unless otherwise specified.

2.2 MISCELLANEOUS METAL FRAMING

A. Subgirts: Manufacturer's 7/8" C- or Z-shaped sections, with gauge per product requirements. Minimum 14 ga. flat strap, minimum 20 ga. nominal thickness.

B. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 MISCELLANEOUS MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated.

B. Panel Fasteners: Suitable fasteners designed to withstand design loads. Stainless steel fasteners with minimum 7/16" dia. head and EPDM, PVC, or neoprene sealing washers.

2.4 METAL PLATE WALL PANELS

A. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into a Dri-design dry-joint pressure equalized rainscreen system with interlocking gutter and drainage system integral to the panel with single horizontal attachment to complete a dri-joint rainscreen assembly. The use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of the system are not allowed.

1. Basis-of-Design Products: Subject to compliance with requirements, panels shall be manufactured by Dri-Design, Holland, Michigan, 515-226-1155.
   a. Dri-Design Painted Aluminum Wall Panels.
2. Material: Tension-leveled, smooth 3003-H14 aluminum sheet, 0.080" thick.

3. Panel Depth: 1-1/4 inch.
4. Joints: Four way joints shall be uninterrupted without the use of flashing, trim or sealants.
5. Formed corners, fascia/soffit and endwall panels required as noted on the drawings.
6. Exterior Finish: Two-coat fluoropolymer Kynar resin finish Post Painted as manufactured by Valspar, PPG, Akzo Noble or equivalent.
   a. Color: As selected by Architect from manufacturer’s full range.

2.5 ACCESSORIES

A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, and similar items. Match material and finish of panels unless otherwise indicated.

B. Flashing and Trim: Same material, finish, and color as adjacent metal plate wall panels, minimum 0.040 inch thick unless otherwise indicated. Select Flashing/Trim or Extrusions

C. Manufacturer’s Standard Extrusions: Provide integral drainage system and manufacturer’s standard extrusions at termination of dissimilar materials.

D. Weather Resistive Barriers: Installed by others.

2.6 FABRICATION

A. General: Fabricate and finish metal plate wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Metal Plate Wall Panels: Fabricate panels with panel stiffeners as required to comply with deflection limits. Weld and grind panel corners smooth.

C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal plate wall panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal plate wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal plate wall panel manufacturer.
3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal plate wall panels to verify actual locations of penetrations relative to seam locations of panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous metal plate wall panel support members and anchorage according to ASTM C 754 and panel manufacturer's written instructions.

3.3 METAL PLATE WALL PANEL INSTALLATION

A. General: Install metal plate wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement. Install panels according to manufacturer’s pressure equalization rainscreen installation method in strict accordance to the manufacturer’s installation guidelines.

1. Commence metal plate wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
2. Shim or otherwise plumb substrates receiving metal plate wall panels.
3. Flash and seal metal plate wall panels with weather closures at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.
4. Install flashing and trim as metal plate wall panel work proceeds.
5. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Aluminum Plate Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal plate wall panel manufacturer.

D. Attachment System, General: Install attachment system required to support metal plate wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
2. Do not apply sealants to joints unless otherwise indicated on drawings or manufacturer’s shop drawings.

E. Rainscreen-Principle Installation: Provide manufacturer's standard pressure-equalized, rainscreen-principle system factory-formed metal plate wall panels fabricated from single sheets of metal formed with interlocking gutter and drainage system integral to the panel with single horizontal attachment to complete dry joint rainscreen assembly. The use of secondary drainage channels, brackets, support pins, joint sealants or gasket to manage the drainage of the system are not allowed. Attach metal plate wall panels in a progressive interlocking method by engaging bottom of panel in top of previous panel working left to right.

1. Install metal plate wall panels with single top attachment in pre-punched holes to allow individual panels to free-float. Do not fasten perimeter of panels or compromise internal gutter.
2. Do not apply sealants to joints unless otherwise indicated on Drawings.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal plate wall panel assembly including trim, copings, corners, and standard extrusion covers, flashings, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install

work with laps, joints, and seams that will be permanently watertight and weather resistant.

C. Weather Resistive Barrier: To be installed by others. This Contractor to inspect and determine if installation is acceptable to them and that the barrier will serve the purpose required by Dri-Design.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal plate wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal plate wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.

B. After metal plate wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal plate wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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SECTION 07 54 19

POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Polyvinyl Chloride (PVC) sheet roofing adhered to roof deck.

1.2 RELATED WORK

A. Treated wood framing, blocking, and nailers: Section 06 10 00, ROUGH CARPENTRY

B. Roof Insulation: Section 07 22 00, ROOF AND DECK INSULATION.

C. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 APPLICABLE PUBLICATIONS

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

B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

C. ASTM International (ASTM):

D4263-83(2005).....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

D4434-09.....Poly (Vinyl Chloride) Sheet Roofing

E96-10.....Water Vapor Transmission of Materials

E108-10.....Standard Test Methods for Fire Tests of Roof Coverings

D. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

ASHRAE 90.1-2010.....Energy Standard for Buildings Except Low-Rise Residential Buildings, Appendix f.

E. FM Approvals: RoofNav Approved Roofing Assemblies and Products.

4470-12.....Approved Standard for Class 1 Roof Coverings

1-28-09.....Loss Prevention Data Sheet: Design Wind Loads.

1-29-09.....Loss Prevention Data Sheet: Above-Deck Roof Components

1-49-09.....Loss Prevention Data Sheet: Perimeter Flashing

F. National Roofing Contractors Association: Roofing and Waterproofing Manual

1.4 PERFORMANCE REQUIREMENTS

A. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

B. Roofing System Energy Performance Requirements: Provide a roofing system identical to components that that have been successfully tested by a qualified independent testing and inspecting agency to meet the following requirements:

1.5 QUALITY CONTROL

A. Installer Qualifications:

1. Licensed or approved in writing by manufacturer to perform work under warranty requirements of this Section.
2. Employ full-time supervisors knowledgeable and experienced in roofing of similar types and scopes, and able to communicate with owner and workers.

B. Product/Material Requirements:

1. Obtain products from single manufacturer or from sources recommended by manufacturer for use with roofing system and incorporated in manufacturer's warranty.

C. Roofing system design standard requirements:

1. Recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to modified bituminous sheet roofing for storage, handling and application.
2. Recommendations of FM Approvals 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
3. Recommendations of ANSI/SPRI ES-1 for roof edge design.
4. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
5. FM Approvals Listing: Provide roofing membrane, base flashing, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a roofing system and that are listed in FM Approvals "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.

D. Pre-Roofing Meeting:

1. Upon completion of roof deck installation and prior to any roofing application, hold a pre-roofing meeting arranged by the Contractor

and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and Project Manager.

2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
3. Inspect roof deck at this time to:
   a. Verify that work of other trades which penetrates roof deck is completed.
   b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
   c. Examine samples and installation instructions of manufacturer.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, SAMPLES.
B. Product Data:
   1. Adhesive materials.
   2. Membrane sheet roofing and flashing membrane.
   3. Roofing cement.
   4. Fastening requirements.
   5. Application instructions.
C. Shop Drawings: Include plans, sections, details, and attachments.
   1. Base flashings and terminations.
D. Certificates:
   1. Indicating materials and method of application of roofing system meets requirements of FM Approvals "RoofNav" for specified fire/windstorm classification.
E. Warranty: As specified.
F. Documentation of supervisors' and inspectors' qualifications.
G. Field reports of roofing inspector.
H. Temporary protection plan. Include list of proposed temporary materials.
I. Contract Close-out Submittals:
   1. Maintenance Manuals.
   2. Warranty signed by installer and manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to single ply membrane roofing for storage, handling and installation.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Environmental Controls: Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

C. Protection of interior spaces: Refer to Section 01 00 00, GENERAL REQUIREMENTS.

1.9 WARRANTY

Roofing work subject to the terms of the Article "Warranty of Construction," FAR clause 52.246-21, except extend the warranty period to 10 years.

PART 2 - PRODUCTS

2.1 PVC SHEET ROOFING

A. Energy Star rated PVC Sheet: ASTM D4434, Type II, 1.5 mm (60 mils) thick, with no backing.
   1. Color: White.

B. Additional Properties:
   1. Water Vapor Permeance, ASTM E96: Minimum 0.14 perms (Water Method).
   2. Fire Resistance, ASTM E108: Class A; no combustion beyond flame/heat source.

2.2 ACCESSORIES:

A. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.

B. Bonding Adhesive: Manufacturer's standard, water based.

C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 25 by 3 mm (1 by 1/8 inch) thick; with anchors.

D. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 25 mm wide by 1.3 mm (1 inch wide by 0.05 inch) thick, prepunched.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with FM Approvals 4470, designed for fastening membrane to substrate.

F. Miscellaneous Accessories: Provide sealers, preformed flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories acceptable to manufacturer.

2.3 ADHESIVE AND SEALANT MATERIALS:

A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates and conditions with roofing Installer and roofing inspector to verify compliance with project requirements and suitability to accept subsequent roofing work. Correct unsatisfactory conditions before proceeding with roofing work.

B. Do not apply roofing if roof surface will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless system is protected.

3.2 PREPARATION

A. Complete roof deck construction prior to commencing roofing work:

1. Install curbs, blocking, edge strips, nailers, cants, and other components where insulation, roofing, and base flashing is attached to, in place ready to receive insulation and roofing.
2. Complete deck and insulation to provide designed drainage to working roof drains.
3. Document installation of related materials to be concealed prior to installing roofing work.

B. 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.

C. Sweep decks to broom clean condition. Remove all dust, dirt or debris.

D. Remove projections that might damage materials.

E. Concrete Decks, except Insulating Concrete:

1. Test concrete decks for moisture prior to application of roofing materials. Test for capillary moisture by plastic sheet method according to ASTM D4263.

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 system.

3.3 TEMPORARY PROTECTION

A. Install temporary protection at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent. Comply with approved temporary protection plan.
B. Install temporary cap flashing over the top of base flashings where permanent flashings are not in place to provide 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.
C. Provide for removal of water or drainage of water away from the work.
D. Provide temporary protection over installed roofing by means of duckboard walkways, plywood platforms, or other materials, as approved by Project Manager, 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.

3.4 INSTALLATION, GENERAL

A. FM Approvals Installation Standard: Install roofing membrane, base flashings, wood cants, blocking, curbs, and nailers, and component materials in compliance with requirements in FM 4450 and FM 4470 as part of a membrane roofing system as listed in FM Approval's "RoofNav" for fire/windstorm classification indicated. Comply with recommendations in FM Approvals' Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.
B. NRCA Installation Standard: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations.
C. Manufacturer Recommendations: Comply with roofing system manufacturer's written installation recommendations.
D. Coordination with related work: Coordinate roof operations with roof insulation and sheet metal work so that insulation and flashings are installed concurrently to permit continuous roofing operations.
E. Installation Conditions:
   1. Apply dry roofing materials. Apply roofing work over dry substrates and materials.
   2. Apply materials within temperature range and surface and ambient conditions recommended by manufacturer.
   3. 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:

a. Do not apply materials when the temperature is below 4 deg. C (40 deg. F).

b. Do not apply materials to substrate having temperature of 4 deg. C (40 deg. F) or less.

3.5 INSTALLATION OF PVC ROOFING

A. Do not allow the membrane to come in contact with surfaces contaminated with asphalt, coal tar, oil, grease, or other substances which are not compatible with PVC.

B. Install the membrane so the sheets run perpendicular to the long dimension of the insulation boards.

C. Commence installation at the low point of the roof and work towards the high point. Lap the sheets so the flow of water is not against the edges of the sheet.

D. Position the membrane so it is free of buckles and wrinkles.

E. Roll sheet out on deck; inspect for defects as being rolled out and remove defective areas. Allow for relaxing before proceeding.

1. Lap edges and ends of sheets 50 mm (two inches) or more as recommended by the manufacturer.
2. Heat weld or solvent weld laps. Apply pressure as required. Seam strength of laps as required by ASTM D4434.
3. Check seams to ensure continuous adhesion and correct defects.
4. Finish edges of laps with a continuous beveled bead of sealant to sheet edges to provide smooth transition.
5. Finish seams as the membrane is being installed (same day).
6. Anchor perimeter to deck or wall as specified.

F. Repair areas of welded seams where samples have been taken or marginal welds, bond voids, or skips occurs.

G. Repair fishmouths and wrinkles by cutting to lay flat and installing patch over cut area extending 100 mm (four-inches) beyond cut.

H. Membrane Perimeter Anchorage:

1. Install metal fastening strip at the perimeter of each roof level, curb flashing, expansion joints and similar penetrations as indicated and in accordance with membrane manufacturer's instructions on top of roof membrane to deck or wall.
2. Mechanically Fastened Metal Fastening Strip:

a. Set top of mechanical fastener set flush with top surface of the metal fastening strip. Space mechanical fasteners a maximum 300

mm (12 inches) on center starting 25 mm (one inch) from the end of the nailing strip.

b. When strips are cut round corners and eliminate sharp corners.

c. After mechanically fastening strip cover and seal strip with a six-inch wide roof membrane strip; heat or solvent weld to roof membrane and seal edges.

d. At roof edge metal, turn the membrane down over the front edge of the blocking or the nailer to below blocking. Secure the membrane to the vertical portion of the nailer; or, if required by the membrane manufacturer with fasteners spaced not over 300 mm (12 inches) on centers.

e. At parapet walls, intersecting building walls and curbs, secure the membrane to the structural deck with fasteners 300 mm (12 inches) on centers or as shown on NRCA manual.

I. Adhered System:

1. Apply adhesive in quantities required by roof membrane manufacturer.
2. Fold sheet back on itself after rolling out and coat the bottom side of the membrane and the top of the deck with adhesive. Do not coat the lap joint area.
3. After adhesive has set according to adhesive manufacturers application instruction, roll the membrane into the adhesive in a manner that minimizes voids and wrinkles.
4. Repeat for other half of sheet. Cut voids and wrinkles to lay flat and clean for repair patch over cut area.

3.6 INSTALLATION OF FLASHING

A. Install flashings as the membrane is being installed. If the flashing can not be completely installed in one day, complete the installation until the flashing is in a watertight condition and provide temporary covers or seals.

B. Flashing Roof Drains:

1. Install roof drain flashing as recommended by the membrane manufacturer, generally as follows:

a. Coordinate to set the metal drain flashing in asphalt roof cement, holding cement back from the edge of the metal flange.

b. Do not allow the roof cement to come in contact with the PVC roof membrane.

c. Adhere the PVC roof membrane to the metal flashing with the membrane manufacturer's recommended adhesive.

2. Turn down the metal drain flashing and PVC roof membrane into the drain body and install clamping ring and strainer.

C. Installing PVC Base Flashing and Pipe Flashing:
   1. Install PVC flashing membranes to pipes, wall or curbs to a height not less than eight-inches above roof surfaces and 100 mm (four inches) on roof membrane.
      a. Adhere flashing to pipe, wall or curb with adhesive.
      b. Form inside and outside corners of PVC flashing membrane in accordance with NRCA manual. Form pipe flashing in accordance with NRCA manual use pipe boot.
      c. Lap ends not less than 100 mm (four inches).
      d. Heat weld or solvent weld flashing membranes together and flashing membranes to roof membranes. Finish exposed edges with sealant as specified.
      e. Install flashing membranes in accordance with NRCA manual.
   2. Anchor top of flashing to walls or curbs with fasteners spaced not over 200 mm (eight inches) on centers. Use fastening strip on ducts. Use pipe clamps on pipes or other round penetrations.
   3. Apply sealant to top edge of flashing.

D. Installing Building Expansion Joints:
   1. Install base flashing on curbs as specified.
   2. Coordinate installation with metal expansion joint cover or roof expansion joint system.
   3. Install flexible tubing 1-1/2 times width of joint over joint. Cover tubing with PVC flashing strip adhered to base flashing and lapping base flashing 100 mm (four inches). Finish edges of laps with sealants as specified.

E. Repairs to membrane and flashings:
   1. Remove sections of PVC sheet roofing or flashing that is creased wrinkled or fishmouthed.
   2. Cover removed areas, cuts and damaged areas with a patch extending 100 mm (four inches) beyond damaged, cut, or removed area. Heat weld or solvent weld to roof membrane or flashing. Finish edge of lap with sealant as specified.

3.7 FIELD QUALITY CONTROL:

A. Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.

B. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 7 full-time days on site to perform roof tests and inspections and to prepare start up, interim, and final reports.

1. Examine and probe seams in the membrane and flashing in the presence of Project Manager and Membrane Manufacturer's Inspector.
2. Probe edge of welded seams with a blunt tipped instrument. Use sufficient hand pressure to detect marginal welds, voids, skips, and fishmouths.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

D. Repair or remove and replace components of roofing work where test results or inspections indicate that they do not comply with specified requirements.
1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of acceptance by Owner.

C. Clean overspray and spillage from adjacent construction. Clean membrane and restore surface to like-new condition meeting solar reflectance requirements.

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SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fasciae, drainage specialties, and formed expansion joint covers are specified in this section.

1.2 RELATED WORK

A. Membrane base flashings and stripping: Section 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING.

B. Flashing components of factory finished roofing and wall systems: Division 07 roofing and wall system sections.

C. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

D. Flashing of Roof Drains: Section 22 14 00, FACILITY STORM DRAINAGE.

1.3 APPLICABLE PUBLICATIONS

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

B. Aluminum Association (AA):

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

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

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

C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

D. American Architectural Manufacturers Association (AAMA):

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

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

E. ASTM International (ASTM):

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A653/A653M-09.....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

B370-09.....Copper Sheet and Strip for Building Construction

D173-03.....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

D412-06.....Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1187-97(R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D1784-08.....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

D4586-07.....Asphalt Roof Cement, Asbestos Free

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

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

AMP 500-06.....Metal Finishes Manual

H. Federal Specification (Fed. Spec):

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

UU-B-790A.....Building Paper, Vegetable Fiber

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

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:
   1. Wind Zone 2: 31 to 45 lbf/sq. ft.: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: For all specified items, including:
   1. Flashings
   2. Copings
   3. Gravel Stop-Fascia
   4. Gutter and Conductors
   5. Expansion joints
   6. Fascia-cant
   7. Pipe Flashings
   8. Sheet Metal Pitch Pans
   9. Wind Uplift Calculation

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

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Copper ASTM B370, cold-rolled temper.

B. Prefinished Galvanized Steel Sheet: Coil coated, commercial quality steel sheet, ASTM A526 or ASTM A527, G90 hot-dip galvanized and with 70 percent “Kynar 500” resin finish over epoxy primer; minimum system thickness 1.0 mil and with manufacturer’s standard prime coat on underside. Provide strippable protective film on prefinished surface.

2.2 FLASHING ACCESSORIES

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m^2(6 lbs/100 sf).

C. Bituminous Paint: ASTM D1187, Type I.

D. Fasteners:

1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
   a. Length to provide not less than 7/8 inch penetration into anchorage.
3. Rivets: Not less than 3 mm (1/8 inch) diameter.
4. Expansion Shields: Fed Spec A-A-1925A.

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

F. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):
1. Copper: 10 oz minimum 0.013 inch thick.
2. Galvanized steel: 0.021 inch thick.

C. Exposed Locations:
1. Thickness is specified with each item below.

2.4 FABRICATION, GENERAL

A. Jointing:
1. In general, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 20 oz weight or stainless steel over 0.018 inch thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 3/4 inch wide.
   b. Lap joints subject to stress shall finish not less than one inch wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 4 inches wide.
4. Flat and lap joints shall be made in direction of flow.
5. Edges of bituminous coated copper, copper covered paper, nonreinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 4 inches in the direction

of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.

6. Soldering:
   a. Pre tin both mating surfaces with solder for a width not less than 1 1/2 inches of uncoated copper, stainless steel, and copper clad stainless steel.
   b. Wire brush to produce a bright surface before soldering lead coated copper.
   c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
   d. Completely remove acid and flux after soldering is completed.

B. Exposed Trim, Gravel Stops and Fascia:
   1. Galvanized Steel: 0.0299 inch thick, 22 gauge. Prefinished.

C. Copings:
   1. Galvanized Steel: 0.0359 inch thick, 20 gauge. Prefinished.

D. Scuppers:
   1. 16 oz. Copper at masonry wall thru-wall scuppers.

E. Base Flashing:
   1. Galvanized Steel: 0.0239 inch thick, 24 gauge.

F. Counter Flashing:
   1. Galvanized Steel: 0.0239 inch thick, 24 gauge.

G. Flashing Receivers:
   1. Galvanized Steel: 0.0239 inch thick, 24 gauge.

H. Equipment Support Flashing:
   1. Galvanized Steel: 0.0359 inch thick at cap member.
   2. Aluminum: 0.0320 inch thick at aluminum framed units.

I. Roof Penetration Flashing:
   1. Lead: 4.0 lb/ sq.ft., hard-tempered.

J. Roof Expansion Joint Cover:
   1. Galvanized Steel: 0.0359 inch thick at cap member.
   2. Counterflashing: 0.0239 inch thick, 24 gauge.

K. Roof-to Wall Expansion Joint Cover:
   1. Galvanized Steel: 0.0359 inch thick at cap member.
   2. Counterflashing: 0.0239 inch thick, 24 gauge.

L. Flush Roof Expansion Joint System:
   1. SITURA Waterproof Expansion Joint System.

M. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 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 3/4 inch loose lock where shown.

N. Edges:
1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 1/4 inch to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 1/4 inch hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 1/4 inch minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
3. All metal roof edges shall meet requirements of IBC, current edition.

O. Metal Options:
1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISHES

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.

B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.

C. Finish exposed metal surfaces as follows, unless specified otherwise:
1. Copper: Mill finish.
2. Stainless Steel: Finish No. 2B or 2D.
3. Galvanized Steel:
   a. Manufacturer's finish:
      1) Baked on prime coat over a phosphate coating.
      2) Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 THROUGH-WALL FLASHINGS

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 1/16 inch

deep transverse channels spaced four to every one inch, or ribbed diagonal pattern, or having other deformation unless specified otherwise.

1. Fabricate in not less than 8 feet lengths; 10 feet maximum lengths.
2. Fabricate so keying nests at overlaps.

B. For Masonry Work When Concealed Except for Drip:

1. Use copper.
2. Form an integral dam at least 3/16 inch high at back edge.
3. Form exposed portions of flashing with drip, approximately 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 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 Cast Stone Panels.

1. Use plan flat sheet of copper.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:

1. Use copper.
2. Fabricate flashing at ends with folded corners to turn up 3/16 inch in first vertical masonry joint beyond masonry opening.
3. Turn up back edge as shown.
4. Form exposed portion with drip as specified or receiver.

F. Door Sill Flashing:

1. Where concealed, use either 20 oz copper or 0.018 inch thick copper clad stainless steel.
2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use 24 ounce copper.
3. Fabricate flashing at ends to turn up 3/16 inch in first vertical masonry joint beyond masonry opening with folded corners.

2.7 CONDUCTORS (DOWNSPOUTS)

A. Fabricate conductors of same metal and thickness as gutters in sections approximately 10 feet long **[**with 3/4 inch wide flat locked seams**]**.

1. Fabricate open face channel shape with hemmed longitudinal edges.

B. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.

C. Fabricate conductor brackets or hangers of same material as conductor, 1/16 inch thick by one inch minimum width.

D. Conductor Heads:

1. Fabricate of same material as conductor.
2. Fabricate conductor heads to not less than 10 inch wide by 8 inch deep by 8 inches from front to back.
3. Form front and side edges channel shape not less than 1/2 inch wide flanges with edge hemmed.
4. Slope bottom to sleeve to conductor or downspout at not less than 60 degree angle.
5. Extend wall edge not less than one inch above front edge.
6. Solder joints for water tight assembly.
7. Fabricate outlet tube or sleeve at bottom not less than 2 inches long to insert into conductor.

2.8 SPLASHPANS

A. Fabricate splashpans from the following:

1. 16 oz copper.

B. Fabricate in accordance with Architectural Sheet Metal Manual Plate 35 with not less than two ribs as shown in alternate section.

2.9 REGLETS

A. Fabricate reglets of one of the following materials:

1. 16 ounce copper.

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 3/4 inch deep, nor more than 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 3/8 inch, 45 degree snap lock.

2.10 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 0.015 inch thick, mechanically and adhesively bonded to both sides of a 1/16 inch thick neoprene or butyl sheet, or to a 32 mil thick reinforced chlorinated polyethylene sheet. Adhesively attach a 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 1/16 inch thick vinyl sheet, flanged at both sides with stainless steel strips not less than 0.015 inch thick. Vinyl sheet locked and encased by the stainless steel strip and prepunched for nailing. A 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 2 inches with hemmed edge for lock to edge strip.

2.11 SCUPPERS

A. Fabricate scuppers with minimum of 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 1/2 inch beyond face of wall with drip at bottom outlet edge.

D. Fabricate not less than 4 inch wide flange to lap behind gravel stop fascia.

E. Fabricate exterior wall flange for through wall scupper not less than one inch wide on top and sides with edges hemmed.

F. Fabricate gravel stop bar of one by one inch angle strip soldered to bottom of scupper.

G. Fabricate scupper not less than 8 inch wide and not less than 5 inch high for through wall scupper.

H. Solder joints watertight.

2.12 GOOSENECK ROOF VENTILATORS

A. Form of 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 4 inch high sleeve to ventilator.
      b. Form for concealed anchorage to structural curb and to bear on structural curb.
      c. Form bottom edge of curb as counterflashing to lap base flashing.

B. Provide open end with 16 gage, stainless steel wire guard of 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 1/4 inch with sheet metal compatible with the roofing and flashing material used.
   5. 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.
   6. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
   7. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space

rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.

8. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
9. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
10. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
11. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
12. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
13. Isolate aluminum in contact with dissimilar metals others than stainless steel, 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.
14. Bitumen Stops:
    a. Install bitumen stops for built-up roof opening penetrations through deck and at formed sheet metal gravel stops.
    b. Nail leg of bitumen stop at 300 mm (12 inch) intervals to nailing strip at roof edge before roofing material is installed.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.

2. Where exposed portions are used as a counterflashings, lap base flashings at least 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 1/4 inch with drip edge where not part of counter flashing.
5. Turn back edge up 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 1 1/2 inch into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 1/4 inch with drip edge.
8. Lap end joints at least two corrugations, but not less than 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 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 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 6 inch on center.

B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 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 8 inch below floor slab and extend into backup masonry joint at floor slab 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 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 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 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 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 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 6 inch beyond door jamb opening at ends. Turn up approximately 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 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 4 inch.
   3. Install upper edge or top of counterflashing not less than 9 inch above top of the roofing.
   4. Lap joints not less than 4 inch. Stagger joints with relation to metal base flashing joints.
   5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
   6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:
   1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
   2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 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 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 1 x 1/8 inch bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
      c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:
   1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
   2. Surface applied type receiver:
      a. Secure to face construction in accordance, with manufacturers instructions.
      b. Completely fill space at the top edge of receiver with sealant.
   3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
D. Where vented edge occur install so lower edge of counterflashing is against base flashing.
E. When counter flashing is a component of other flashing install as shown.

3.4 REGLETS

A. Install reglets in a manner to provide a watertight installation.
B. Locate reglets not less than 9 inch nor more than 16 inch above roofing, and not less than 5 inch nor more than 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.

3.5 GRAVEL STOPS

A. General:
   1. Install gravel stops and fascias with allowance for expansion at each joint; minimum of 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 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 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.

3.6 Scuppers:

A. General

1. Install scupper with flange behind gravel stops; leave 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 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. Galvanized Steel Copings:

1. Join ends of sheets by a 3/4 inch locked and soldered seam, except at intervals of 32 feet, provide a 1 1/2 inch loose locked expansion joint filled with sealant or mastic.
2. At straight runs between 24 feet and 64 feet locate expansion joint at center.
3. At straight runs that exceed 32 feet and form the leg of a corner locate the expansion joint not more than 16 feet from the corner.

3.8 EXPANSION JOINT COVERS, INSULATED

A. Install insulated expansion joint covers at locations shown on curbs not less than 8 inch high above roof surface.

B. Install continuous edge strips of same metal as expansion joint flange, nailed at not less than 3 inch centers.

C. Install insulated expansion joint covers in accordance with manufacturer's directions locking edges to edge strips.

3.9 CONDUCTORS (DOWNSPOUTS)

A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.

B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 1/2 inch movement for each 10 feet of downspout.

C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

3.10 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.

3.11 GOOSENECK ROOF VENTILATORS

A. Install on structural curb not less than 8 inch high above roof surface.

B. Securely anchor ventilator curb to structural curb with fasteners spaced not over 12 inch on center.

C. Anchor gooseneck to curb with screws having nonprene washers at 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 and equipment supports.

1.2 RELATED WORK

A. General insulation: Section 07 21 13, THERMAL INSULATION. Rigid insulations for roofing: Section 07 22 00, ROOF AND DECK INSULATION

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. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.

C. Manufacturer's Literature and Data: Each item specified.

D. 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-11.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process

B209/209M-10.....Aluminum and Aluminum Alloy-Sheet and Plate

B221/221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

C612-10.....Mineral Fiber Block and Board Thermal Insulation

D1187-97(R2011).....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):

2605-13.....High Performance Organic Coatings on Architectural Extrusions and Panels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Sheet: ASTM B209/B209M.

2.2 ROOF HATCH (SCUTTLE)

A. Fabricate from aluminum with mill finish.

B. Curb and Cover:

1. Exterior facing: Minimum 2.3 mm (0.09 inch) thick sheet aluminum.
2. Interior facing: Minimum 1 mm (0.04 inch) thick sheet aluminum.
3. Minimum of 25 mm (one inch) thick mineral fiber insulation between facings of cover and over exterior face of curb.
4. Form exterior curb facing with an integral three inch wide roof flange and cap flashing minimum 2.3 mm (0.09 inch) thick sheet aluminum.
5. Make curb 300 mm (12 inches) above roof surface.
6. Form cover to lap curb and cap flashing.
7. Size opening 36” wide x 30” long (hinge side).

C. Hardware:

1. Provide spring snap latch with inside and outside operating handles and padlock hasp on inside.
2. Provide pintle hinges.
3. Provide automatic hold open and operating arm with enclosed torsion or compression spring lifting mechanism.
4. Covers shall automatically lock in the open position at not less than 70 degrees.
5. Provide weatherstripping at cover closure.
6. Galvanize all hardware items.

D. Assembly:

1. Completely shop assemble roof scuttle.

2. Fully weld all joints exposed to the weather and built into the roofing.
3. Finish weld smooth where exposed.
4. Operation with minimum force to open and close.

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.
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. Aluminum, Mill Finish: AA-M1x, 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: 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 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies mineral fiber and cementitious coverings to provide fire resistance to interior structural steel members shown.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. 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 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 Project Manager, 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(R2008).....Installation of Interior Lathing and Furring
C847-10.....Metal Lath
E84-10.....Surface Burning Characteristics of Building Materials
E119-10.....Fire Tests of Building Construction and Materials

E605-93(R2006).....Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members

E736-00(R2006).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92(R2005).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92(R2005).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92(R2005).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93(R2006).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93(R2005).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

E1042-02(R2008).....Acoustically, Absorptive Materials Applied by Trowel or Spray.

G21-09.....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.
   2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 15 lb/ft^3 density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

B. Single component, water based, factory mixed, asbestos free, intumescent material blended for uniform texture.

C. Materials containing asbestos are not permitted.

D. 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 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 200 lbf/ft^2 for protected areas. 400 lbf/ft^2 for exposed areas.
5.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter.025 gm/ft^2.
6.	Compressive Strength	ASTM E761	Minimum compressive strength 1000psf.
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 II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

2.3 SEALER

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

2.4 WATER

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

2.5 MECHANICAL BOND MATERIAL

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg/m^2 (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

2.6 SPRAYED-ON INTUMESCENT FIREPROOFING (AT EXPOSED STRUCTURAL STEEL LOCATIONS)

A. Single component, water based, factory mixed, asbestos free, intumescent material blended for uniform texture.

B. Intumescent fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Dry Density	ASTM E605	Minimum Density 85 lbs/cu ft when set and dry
2.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.
3.	Bond Impact	ASTM E760	No cracking, spalling, or delamination. 0.77-ft-lbs/ in of notch
4.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 190 lb/in^2
5.	Compressive Strength	ASTM E761	300 lbs/ sq in
6.	Hardness		45-50
7.	Surface Burning Characteristics	ASTM E84	Flame spread 2 or less smoke developed 5 or less

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 in accordance with SSPC guidelines.

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 12-inches or more in width.
3. Apply to column flanges 16-inches or more in width.
4. Apply to beam or column web 16-inches or more in depth.
5. Tack weld or mechanically fasten on maximum of 12-inch center.
6. 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 not an integral part of the materials, in accordance with the manufacturer's instructions.
3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
4. Minimum applied dry density per 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 - 15 lb/ft^3.
   b. Type II - 22 lb/ft^3.
   c. Intumenscent Fireproofing – 85 lb/ft^3.

E. Application shall be completed in one area, inspected and approved by Project Manager before removal of application equipment and proceeding with further work.

3.3 PATCHING AND REPAIRING

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.

1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
3. Hand mixing of material is not permitted.

C. Repair:

1. Respray all 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.

3.4 SCHEDULE

A. Apply fireproofing material in interior structural steel members and on underside of interior steel floor and roof decks, except on following surfaces:

1. Structural steel and underside of steel decks in machine rooms.
2. Steel members in elevator hoist ways.
3. Areas used as air handling plenums.
4. Steel to be encased in concrete or designated to receive other type of fireproofing.

B. Type I:

1. Two hour fire rating.

C. Type II:

1. Two hour fire rating.

D. Intumescent Fireproofing:

1. Two hour fire rating.

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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. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

B. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

C. Sealants and application: Section 07 92 00, JOINT SEALANTS.

D. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

C. List of FM, UL, or WH classification number of systems installed.

D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

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”, 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):
E84-10.....Surface Burning Characteristics of Building Materials
E814-11.....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
1479-10.....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 4 in nominal pipe or 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 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 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 Project Manager.

C. Clean up spills of liquid type materials.

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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. Sealing of site work concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

B. Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY.

C. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.

D. Glazing: Section 08 80 00, GLAZING.

E. Glazed aluminum curtain wall: Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.

F. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION and Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

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. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

E. 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 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 90° F or less than 40° 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", 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.

C612-10.....Mineral Fiber Block and Board Thermal Insulation.

C717-10.....Standard Terminology of Building Seals and Sealants.

C834-10.....Latex Sealants.

C919-08.....Use of Sealants in Acoustical Applications.

C920-10.....Elastomeric Joint Sealants.

C1021-08.....Laboratories Engaged in Testing of Building Sealants.

C1193-09.....Standard Guide for Use of Joint Sealants.

C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-09.....Surface Burning Characteristics of Building Materials.

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

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-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.

F. 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.

G. 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.

H. 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 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 1/4 inch, sealant depth equal to width.

B. At widths over 1/4 inch, sealant depth 1/2 of width up to 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 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 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 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. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

3.7 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by 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. Cast Stone to Cast Stone: Type S-1
5. Threshold Setting Bed: Type S-1, S-3, S-4
6. Masonry Expansion and Control Joints: Type S-6

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

E. Interior Caulking:
1. Typical Narrow Joint 1/4 inch or less at Walls and Adjacent Components: Types C-1 and C-2.
2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1 and C-2.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1 and C-2.
4. Exposed Isolation Joints at Top of Full Height Walls: Types C-1 and C-2.
5. Concealed Acoustic Sealant Types S-4, C-1 and C-2.

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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 building expansion joint assemblies.

B. Types of assemblies:

Metal Plate Cover

Elastomeric Joint Covers

Preformed Elastomeric Sealant Joint

1.2 RELATED WORK

A. Sheet Metal Expansion Joint Seals: Section 07 60 00, FLASHING AND SHEET METAL.

B. Color of Elastomer Inserts, Filler Strips, Exterior Wall Seals and Metal Finishes: Section 09 06 00, SCHEDULE FOR FINISHES

C. 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 (R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A283/A283M-07.....Low and Intermediate Tensile Strength Carbon Steel Plates
A786/A786M-05(R2009)....Rolled Steel Floor Plates
B36/B36M-08.....Brass, Plate, Sheet, Strip, and Rolled Bar
B121-01(R2006).....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)

B455-10.....Copper-Zinc Lead Alloy (Leaded Brass) Extruded Shapes

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-11.....Elastomeric Joint Sealants

D1187-97 (R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D2287-96 (R2010).....Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

E119-10.....Fire Tests of Building Construction and Materials

E814-11.....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 Series.....Metal Finishes Manual.

E. National Fire Protection Association (NFPA):

251-06.....Tests of Fire Endurance of Building Construction and Materials

F. Underwriters Laboratories Inc. (UL):

263-11.....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. Vinyl Invertor Sealant Waterstops: Manufacturers' standard shapes and grade.

E. 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.

F. Zinc-Molybdate Primer: Fed. Spec. TT-P-645.

G. 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 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. Fire Barrier Systems:

a. Material to carry label of approved independent testing laboratory, and be subject to follow-up system for quality assurance.

b. Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.

c. For joint widths up to and including six inches, supply barrier in lengths up to 50 feet to eliminate field splicing.

d. For joints within enclosed spaces such as chase walls, include 0.032-inch thick galvanized steel cover where conventional expansion joint cover is not used.

8. Seal Strip factory - formed and bonded to metal frames and anchor members.

9. Compression Seals: Prefabricate from thermoplastic rubber or dense neoprene to sizes and approximate profiles shown.

B. Floor-to-Floor Metal Plate and Extruded Gasket Joints:

1. Frames on each side of joint designed to support cover plate and thermoplastic gasket 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. Frame and cover plates of some metal where exposed.

1) Design cover plates to support 400 lbs per 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 and Extruded Gasket 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. Extruded thermoplastic 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 24-inches.
b. Variable movement extruded rubber primary seal designed to remain in aluminum frame, throughout movement of joint.
1) Flush mounted seal minimum 0.125-inch thick with dual movement grooves designed for plus or minus 50 percent, movement of joint width.
c. Provide factory heat welded transitions where directional changes occur to ensure a watertight system.
d. Provide pantographic wind load supports, maximum 8 feet on center to support seal systems of 12-inches and wider.

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.

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 3-inches from each ends, and, not more than 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 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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Openings

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel doors, steel frames and related components.

B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

A. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

B. Overhead doors: Section 08 36 13, SECTIONAL DOORS.

C. Door Hardware: Section 08 71 00, DOOR HARDWARE.

D. Glazing: Section 08 80 00, GLAZING.

E. Steel mesh partitions, doors, service windows and hardware: Section 10 22 13, WIRE MESH PARTITIONS.

F. Card readers and biometric devices: Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

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. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements and temperature rise rating for stairwell doors. Submit proof of temperature rating.

1.5 SHIPMENT

A. Prior to shipment label each door and 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 doors and 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):

113-01.....Thermal Transmittance of Steel Door and Frame Assemblies

128-09.....Acoustical Performance for Steel Door and Frame Assemblies

A250.8-03 (R2008).....Standard Steel Doors and Frames

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

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A568/568-M-11.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled

A1008-10.....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

D1621-10.....Compressive Properties of Rigid Cellular Plastics

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns

E90-09.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

F. The National Association Architectural Metal Manufactures (NAAMM):

Metal Finishes Manual (AMP 500-06)

G. National Fire Protection Association (NFPA):

80-10.....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. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

B. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

C. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. GENERAL:

1. Follow SDI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per SDI A250.8. Thickness, 1-3/4 inches, unless otherwise shown.
2. Close top edge of exterior doors flush and seal to prevent water intrusion.
3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

B. Heavy Duty Doors: SDI A250.8, Level 2, Model 2 of size and design shown. Core construction types a, d, or f, for interior doors, and, types b, c, e, or f, for exterior doors.

C. Extra Heavy Duty Doors: SDI A250.8, Level 3, Model 2 of size and design shown. Core construction Types d or f, for interior doors, and Types b, c, e, or f, for exterior doors. Use for stairwell doors and security doors.

D. Smoke Doors:

1. Close top and vertical edges flush.
2. Provide seamless vertical edges.
3. Apply Steel astragal to the meeting style at the active leaf of pair of doors or double egress doors.
4. Provide clearance at head, jamb and sill as specified in NFPA 80.

E. Fire Rated Doors (Labeled):

1. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual for the class of door or door opening shown.
2. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.
3. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
4. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 °C (450 °F) above ambient temperature at end of 30 minutes of fire exposure when tested in accordance with ASTM E152.

2.3 METAL FRAMES

A. General:
1. SDI A250.8, 0.053 inch thick sheet steel, types and styles as shown or scheduled.
2. Frames for exterior doors: Fabricate from 0.067 inch thick galvanized steel conforming to ASTM A525.
3. Frames for labeled fire rated doors and windows.
   a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
   b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
4. Frames for doors specified to have automatic door operators; minimum 0.067 inch thick.
5. 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.

C. Terminated Stops: SDI A250.8. Provide on all hollow metal frames.

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. 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 0.053 inch thick steel clip angles welded to jamb and drilled to receive two 1/4 inch floor bolts.

c. Where mullions occur, provide 0.093 inch thick steel channel anchors, drilled for two 1/4 inch floor bolts and frame anchor screws.

d. Where sill sections occur, provide continuous 0.042 inch thick steel rough bucks drilled for 1/4 inch floor bolts and frame anchor screws. Space floor bolts at 24 inches on center.

2. Jamb anchors:

a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 24 inches apart, except for fire rated frames space anchors as required by labeling authority.

b. Form jamb anchors of not less than 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 10 inches. Use one of following type:

1) Wire loop type of 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 1/4 inch inside diameter welded to plate reinforcing at jamb stops or hat shaped formed strap spacers, 2 inches wide, welded to jamb near stop.

2) Drill jamb stop and strap spacers for 1/4 inch flat head bolts to pass thru frame and spacers.

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 4 feet long.
2) Anchors spaced 24 inches on centers maximum.

g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.4 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 1/4 inch diameter expansion bolts.
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 1/4 inch expansion bolts through spacers. Where subframes or rough bucks are used, 1/4 inch expansion bolts on 24 inch centers or power activated drive pins 24 inches on centers.

D. Install anchors for labeled fire rated doors to provide rating as required.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

Install doors and hardware as specified in Sections: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Section 08 14 00, WOOD DOORS; Section 08 71 00, DOOR HARDWARE.

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SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior flush doors with prefinish, prefit option.

B. Section includes fire rated doors, smoke doors.

1.2 RELATED WORK

A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

B. Overhead doors: Section 08 36 13, SECTIONAL DOORS.

C. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.

D. Installation of doors and hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.

E. Glazing: Section 08 80 00, GLAZING.

F. Sealed Blinds: Section 08 81 30, SEALED BLINDS.

G. Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

H. Card readers and biometric devices: Section 28 05 00, COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Corner section of flush veneered door 12 inches square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
2. Veneer sample 8 inch by 11 inch by 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 and pertinent details.
3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

D. Manufacturer's Literature and Data:

1. Labeled fire rated doors showing conformance with NFPA 80.

E. Laboratory Test Reports:

1. Screw holding capacity test report in accordance with WDMA T.M.10.
2. Split resistance test report in accordance with WDMA T.M.5.
3. Cycle/Slam test report in accordance with WDMA T.M.7.
4. Hinge-Loading test report in accordance with WDMA T.M.8.

1.4 WARRANTY

A. Doors are subject to terms of Article titled "Warranty of Construction", except that warranty shall be as follows:

1. For interior doors, manufacturer's warranty for lifetime of original installation.

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, Job Site Information.

C. Label package for door opening where used.

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. Window and Door Manufacturers Association (WDMA):

I.S.1A-11.....Architectural Wood Flush Doors
I.S.4-09.....Water-Repellent Preservative Non-Pressure Treatment for Millwork
I.S.6A-11.....Architectural Wood Stile and Rail Doors
T.M.6-08.....Adhesive (Glue Bond) Durability Test Method
T.M.7-08.....Cycle-Slam Test Method
T.M.8-08.....Hinge Loading Test Method
T.M.10-08.....Screwholding Test Method

C. National Fire Protection Association (NFPA):

80-10.....Protection of Buildings from Exterior Fire
252-08.....Fire Tests of Door Assemblies

PART 2 - PRODUCTS

2.1 FLUSH DOORS

A. General:

1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.

2. Adhesive: Type II
3. Thickness: 1-3/4 inches unless otherwise shown or specified.

B. Face Veneer:
1. In accordance with WDMA I.S.1-A.
2. One species throughout the project unless scheduled or otherwise shown.
3. For transparent finishes: Premium Grade, rotary cut white birch.
a. AA grade face veneer
b. Match face veneers for doors for uniform effect of color and grain at joints.
c. Door edges shall be same species as door face veneer except maple may be used for stile face veneer on birch doors.
d. 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, 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.

D. Fire rated wood doors:
1. Fire Performance Rating:
a. “B” label, 1-1/2 hours.
b. “C” label, 3/4 hour.
2. Labels:
a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
b. Metal labels with raised or incised markings.
3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:

a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.
b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA T.M.7.

4. Additional Hardware Reinforcement:
   a. Provide fire rated doors with hardware reinforcement blocking.
   b. Size of lock blocks as required to secure hardware specified.
   c. Top, bottom and intermediate rail blocks shall measure not less than five inches minimum by full core width.
   d. Reinforcement blocking in compliance with manufacturer's labeling requirements.
   e. Mineral material similar to core is not acceptable.
5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.
6. Provide steel frame approved for use in labeled doors for vision panels.
7. Insulating glass blind systems - Refer to Section 08 81 13 for Sealed Blind lite units.
8. Provide steel astragal on pair of doors.

E. Smoke Barrier Doors:
   1. For glazed openings use steel frames approved for use in labeled doors.
   2. Provide a steel astragal on one leaf of pairs of doors, including double egress doors.

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.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.

2. Use stain when required to produce the finish specified in Section 09 06 00 SHEDULE FOR FINISHES.

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:

A. Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

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 1/8 inch clearance at the jambs, heads, and meeting stiles, and a 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: 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 1/8 inch for each two inches of door thickness.

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.

H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.

I. Apply a steel astragal to meeting style of active leaf of pair of doors or double egress smoke doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

A. Install doors and hardware as specified in this Section.

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 Project Manager.

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SECTION 08 17 20
SLIDING EXAM ROOM DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this section includes exam room door opening assemblies including metal frame, sliding doors, sliding track assembly, door seal components, locking mechanism and associated finish hardware.

1.2 RELATED WORK

A. Blocking for Mounting Frame and Track Assembly: Section 06 10 00, ROUGH CARPENTRY.

1.3 QUALITY ASSURANCE

A. Hardware shall be installed by people knowledgeable and skilled in the application, installation and adjustment of commercial grade doors and door hardware. Doors and Frames must be installed plumb, square and level.

B. Doors frames must be properly prepared and reinforced to install hardware per the manufacturer’s template and installation instructions.

C. Contractor shall provide and furnish screws, bolts, expansions shields or other fasteners to facilitate the proper installation of products, not furnished as part of the Sliding Exam Room Door Assembly.

1.4 WARRANTY

A. Provide manufacturer’s standard limited warranty against defects in material and workmanship unless noted otherwise.

1.5 SUBMITTALS

A. Submit shop drawings with proposed Sliding Exam Room Door Assembly system, product and hardware options, in a timely manner to obtain the approval from architect in time to meet construction schedule of other trades.

B. Provide for each door and frame location; frame type, profile, and installation details, items of finish hardware accessories, finishes, degree of opening.

C. Samples: Provide physical samples as required by Section 01 33 23.

D. Provide Owner Manual, instruction sheets and installation.

1.6 DELIVERY, STORAGE AND HANDLING

A. Sliding Exam Room Door Assembly systems shall be delivered to the general contractor at the job site complete with necessary screws, miscellaneous parts, instructions, and installation templates.

B. Furnish door assemblies with operating hardware with door skin, using protective wrappings and protective spacers between projecting hardware. Maintain and protect door assemblies using cardboard spacers and protective edge guards along the door edges, to reduce exposure to marring or damage during storage.

C. Store door assemblies in a dry and secure area. Storage area shall be void of any excess humidity that can cause damage to the product.

1.7 APPLICABLE PUBLICATIONS

A. The following references established standards for architectural

B. Door and Hardware Institute (DHI)

1. Recommended Locations for Builder's Hardware for Standard Doors and Frames (2004)

C. Approved Testing Laboratories

1. Underwriter's Laboratories, Inc. (UL)

a. UL1784 (2004): Air Leakage Tests of Door Assemblies

D. Building Codes [Applicable Building Code]

1. 2009 International Building Code

2. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards - 1998) unless specified otherwise

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of design manufacturer:

1. DIRTT Environmental Solutions, 1000, 325 North Wells St., 10th Floor, Chicago, IL. 60654 (312-245-2870).

Bidding on:

Manufacturer name _____

Model _____

No. _____

2.2 MATERIAL REQUIREMENTS

A. Sliding Exam Room Door Assembly requirements:

1. Comply with UFAS maximum door opening force of 5 lbs.

B. Door requirements: Solid core wood door, 1 ¾" x 3'-6" w. except provide 4'-0" w. doors at the following Bariatric Exam Rooms in Primary Care: 1W117, 1W136 and 1W139

C. Door Frame requirements:

1. Door Frames shall be 4" d. x door width + 4" x height indicated on drawings, Architectural Grade and Structural Aluminum Alloys.

2. Provide suitable adjustable type anchors as recommended by manufacturer.

D. Hardware Requirements:

1. Provide optional door pulls and locking device with interchangeable cores.

E. Door seal components: Rigid/ Flex PVC extrusion (strike and guide side).

2.3 FINISHES

A. Finish Requirements

1. Door Faces: Factory Pre-Finished.
2. Frames and Track Assembly: Factory Pre-Finished Anodized Aluminum.
3. Door Hardware:
   a. Push/Pull Trim: 626
   b. Miscellaneous: To match other finishes
4. PVC Door Seal Color: As selected by Architect.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Contractor is responsible for notification of any wall conditions or building structure that would prevent proper execution of the installation of products.

B. Note short or damaged deliveries on the bill of lading at the time of delivery.

C. Do not fabricate any product until receipt of approved submittal drawings.

D. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Mount furnished hardware accessories at heights indicated in "Recommended Locations or Builder's Hardware" for Standard Doors and Frames, Custom Steel Doors and Frames, established by the Door and Hardware Institute (DHI), except if otherwise indicated or to comply with requirements of governing regulations, or if otherwise directed by the architect.

B. Install furnished hardware accessories in compliance with the manufacturer's instructions, templates and recommendations. Securely fasten all furnished parts. Make sure all operating parts move freely and smoothly without binding, sticking and void of any excessive clearance.

3.3 ADJUSTMENT AND CLEANING

A. Adjust and check door assembly and each operating item of hardware to ensure correct operation and function. Units which cannot be adjusted to operate as intended for the application made shall be replaced.

B. Final Adjustment: Wherever hardware installation is made more than a month prior to building acceptance or occupancy of a space or area, the installer shall return to the work during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items. Hardware Accessories shall be cleaned as necessary to restore correct operation, function, and finish. Do not use cleaners that will harm finish.

3.4 PROTECTION

A. Whenever furnished hardware accessories are located in areas where it may be subject to damage during construction by handling, cleaning, etc., it shall be protected and/or removed from its location until the hazardous condition is terminated.

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SECTION 08 31 00
SLIDING ALUMINUM DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Aluminum Sliding Doors, manual operation

1.2 SUBMITTALS

A. Submit Shop Drawings providing information on both the construction methods and materials applicable to door and frame construction and detailed information applicable to specific installation of the doors and frames.

B. Certify compliance of door and frame construction with requirements of this Section using either a complete written specification or a graphic presentation clearly identifying construction of door top, bottom and edges, facing panel/internal reinforcing.

C. Maintenance Data:

1. Prepare product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.
2. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Assemblies requiring welds shall be in compliance with Standard Code for Arc and Gas Welding of AMERICAN WELDING SOCIETY.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers:

1. Stanley 7000 Series 2 panel ICU
2. Stanley 7500 Series 3 panel ICU
3. Architect approved equivalent

Bidding on:

Manufacturer name _____

Brand _____

No. _____

2.2 MATERIALS

A. Aluminum Sliding Doors:

1. Doors shall be medium stile, low profile aluminum sliding doors constructed of extruded aluminum. Major members shall have a wall thickness of 0.125" minimum.
2. Hardware:
   a. Sliding door units shall be designed with overhead supports; no floor tracks will be accepted.
   b. Provide assembly with breakaway door panels to allow the door to swing 90° from any position in the direction as indicated. Breakaway pressure shall be field adjustable. Provide limiting devices on door panels to limit swing.
   c. Door pulls: Provide a recessed door pull on the push side of the door panels and a recessed style pull on the pull side of the door.

B. Glass: Glass type AT. Refer to Section 08 80 00.

2.3 FINISH:

A. Aluminum Extrusion Finish: Standard anodized finish shall be AA-M12-C22-A31 clear.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install assembly in strict accordance with original design, applicable codes and regulations, reviewed Shop Drawings, and manufacturer’s written instructions, anchoring components firmly in place.

B. Touch up: Upon completion of installation, touch up scuffs and abrasions in shop priming coat.

3.2 ADJUSTING

A. Adjust assembly to function in a smooth operation.

B. Field adjust breakaway pressure in accordance with Code.

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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. Lock Cylinders: 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: Access doors, each type, showing construction, location and installation details.

C. Manufacturer's Literature and Data: Access doors, each type.

1.4 APPLICABLE PUBLICATIONS

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

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

A167-99(R-2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-10.....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy

C. American Welding Society (AWS):

D1.3-08.....Structural Welding Code Sheet Steel

D. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Windows

E. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

F. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

A. Fabricate components to be straight, square, flat and in same plane where required.

1. Slightly round exposed edges and without burrs, snags and sharp edges.
2. Exposed welds continuous and ground smooth.

3. Weld in accordance with AWS D1.3.

B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.

C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

2.2 ACCESS DOORS, FIRE RATED:

A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 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 0.0359 inch thick stainless steel sheet, insulated sandwich type construction.

D. Frame: Form of 0.0598 inch thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.

1. Weld exposed joints in flange and grind smooth.
2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.

E. Automatic Closing Device: Provide automatic closing device for door.

F. Hinge: Continuous steel hinge with stainless steel pin.

G. Lock:

1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
2. Provide latch release device operable from inside of door. Mortise case in door.

2.3 ACCESS DOORS, FLUSH PANEL:

A. Door Panel:

1. Form of 0.0598 inch thick stainless steel sheet.
2. Reinforce to maintain flat surface.

B. Frame:

1. Form of 0.0598 inch thick stainless steel sheet of depth and configuration to suit material and type of construction where installed.
2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
3. Weld exposed joints in flange and grind smooth.

C. Hinge:
1. Concealed spring hinge to allow panel to open 175 degrees.
2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:
1. Flush, screwdriver operated cam lock.

2.4 FINISH:

A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.
B. Stainless Steel: No. 4 for exposed surfaces.

2.5 SIZE:

A. Minimum 36 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, 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 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 13
COILING COUNTER DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies overhead roll up coiling shutters over counter attached to wall.

B. Manual push up operation.

1.2 RELATED WORK

A. Lock cylinder and keying: 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. Manufacturer's Literature and Data:
Shutter, each type.
Installation procedures and instructions.

C. Shop Drawings:
Shutter, each type, showing details of construction and installation.

1.4 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):

A47-99(R2009).....Malleable Iron Castings

A48-03(R2008).....Gray Iron Castings

A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A653-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs

C. American Welding Society (AWS):

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

D1.2-08.....Structural Welding Code Aluminum

D1.3-08.....Structural Welding Code Sheet Steel

D. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 500 Series-2006.....Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):

2605-11.....Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels

F. Federal Specifications (Fed. Spec):

TT-P-645B.....Primer, Paint, Zinc-Molybdates, Alkyd Type

G. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Fire Windows

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5.
2. Sheet: ASTM B209.

B. Stainless Steel: ASTM A167, Type 302 or 304.

C. Steel Pipe: ASTM A53.

D. Casting: ASTM A47 or A48.

2.2 FABRICATION

A. Weld in accordance with AWS applicable code.

B. Non-Fire Rated Shutter:

1. Integral shutter and frame type unit, and related accessories and components required for a complete working installation.
2. Construct for surface mounted installation between walls.
3. Exposed to view components of same metal except as specified.
4. Frame: Minimum heavy duty extruded aluminum jamb sections formed to include guide slots for curtain with receiver for bolts and locks and continuous closure angles. Provide snap-on cover to conceal fasteners.
5. Counterbalance Assembly:

a. Spring barrel or shaft of steel pipe of sufficient strength to ensure deflection not exceeding 0.03 inch per 1-foot of span.
b. Barrel or shaft house oil-tempered, helically wound steel spring, and rotate on grease-sealed ball or roller bearings.
c. Springs adjustable from outside.

6. Brackets: 1/8-inch thick steel plate designed to form end closure support for hood.
7. Operation: Manual Push-up type unless otherwise noted below.
   a. Tube Motor Operation at Reception 1W201: Provide the following device to enable momentary contact close operation.
      1) Provide a 2-wire electric sensing/weather edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a self-coiling cable connection to control circuit.
      2) Control Station: Flush mounted, “Open/Close” key switch with “Stop” push button; NEMA 1B.
8. Curtain:
   a. Flat type slats approximately 1-1/2-inches high by 1.2-inch deep, 0.04 inch aluminum.
   b. Extruded aluminum bottom bar, equipped with recessed flush handles, recessed slide bolts for locking on one end, key operated cylinder lock on other end, and a continuous flexible seal to make tight contact with counter. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
9. Aluminum Shutter:
   a. Curtain: 0.040-inch thick clear anodized aluminum, with anodized aluminum bottom bar.
   b. Frames: Extruded aluminum.

2.3 FINISH

A. Clear anodized aluminum.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturer's instructions.
B. Locate anchors and inserts for guides, brackets, supports, hardware, and other accessories and components accurately.

C. Securely attach guides to adjoining construction with not less than 3/8-inch diameter bolts, spaced near each end and not over 24 inches apart.

1. Use fasteners conforming to ASTM F468 and F593.
2. Use stainless steel bolts with aluminum or stainless steal.
3. Use toggle bolts to frame walls.

3.2 ADJUSTING AND CLEANING

A. Lubricate properly, adjust and demonstrate, to operate freely and as specified.

B. Clean upon completion.

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SECTION 08 36 13
SECTIONAL DOORS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies electrically operated thermal insulated sectional overhead steel doors.

1.2 RELATED WORK:

A. Lock cylinders for cylindrical locks: Section 08 71 00, DOOR HARDWARE.

B. Electrical Installation: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS; Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

1.3 MANUFACTURER'S AND INSTALLER'S QUALIFICATIONS:

A. Manufacturer's regularly engaged in manufacturing items of type specified.

B. Installers under direct supervision of manufacturer's representative or trained personnel.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. 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, showing electrical interlock for motor with manually operated dead lock.

C. Manufacturer's Literature and Data:

1. Brochures or catalog cuts.
2. Manufacturer's installation procedures and instructions.
3. Maintenance instructions, parts list.

D. Certificates:

1. Attesting door, anchors and hardware will withstand the horizontal loads specified.
2. Attesting door complies with thermal performance, air infiltration, and water infiltration requirements.

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):

A36/A36M-08.....Structural Steel

A227/A227M-06.....Steel Wire, Cold-Drawn for Mechanical Springs

A229/229M-99(R2005).....Steel Wire, Oil-Tempered for Mechanical Springs

A653-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvanized) by the Hot Dip Process

C1036-06.....Flat Glass

E84-10.....Surface Burning Characteristics of Building Materials

E283-04.....Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen

E330-02(R2010).....Structural Performance of Exterior Windows, Curtain Walls, and Doors by the Uniform Static Air Pressure Difference.

E331-00(R2009).....Water Penetration of Exterior Windows, Curtain Walls, and Doors by the Uniform Static Air Pressure Difference.

C. American National Standards Institute and Door and Access Systems Manufacturers Association (ANSI/DASMA):

102-04.....Sectional Overhead Type Doors.

D. National Electrical Manufacturer's Association (NEMA):

ICS 2-00 (R2005).....Industrial Control and Systems: Controllers, Contactors, and Overload Relays

MG 1-10.....Motors and Generators

E. National Fire Protection Association (NFPA):

70-11.....National Electrical Code

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

AMP 500-06.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Basis of Design: Clopay Model 3720.

B. Steel: ASTM A653 for forming operations. ASTM A36 for structural sections.

C. Hard Drawn Spring wire: ASTM A227.

D. Oil Tempered Spring wire: ASTM A229.

E. Glass: ASTM C1036

1. Clear Glass: Type 1, Class 1, Quality q5, 1/4 inch thick.
2. Fabricated into sealed insulating glass one inch thick.

F. Weather-strips, Gaskets, and Thermal Breaks:

1. Neoprene, EPDM, PVC, silicone rubber, or other low conductance material.
2. Standard with door manufacturer.

2.2 DESIGN REQUIREMENTS:

A. Wind Load: Design to withstand a horizontal or wind pressure of 30 pounds per square foot of door area without damage when tested in accordance with ASTM E330.

B. Thermal Performance: Maximum U value of 0.05 for door when tested in accordance with ASTM C236.

C. Air Infiltration: Maximum of 0.10 cfm at 15 miles per hour wind speed per foot of crack between door sections and door perimeter opening when tested in accordance with ASTM E283.

D. Water Infiltration: No infiltration when tested in accordance with ASTM E331.

E. Comply with ANSI/NAGDM 102, for an Industrial door and specified design criteria, inside face mounted with tracks at jambs set back a sufficient distance to provide a clear opening when door is in open position.

F. Operation-Cycle Requirements: Door components and operators to operate for not less than 10,000 cycles.

2.3 FABRICATION:

A. Steel Door Sections:

1. Formed of hot-dipped galvanized steel.
2. Meeting rails: interlocking joints with thermal breaks separating face sheets formed to provide weathertight closure and alignment for full width of door.

3. Height of sections: Not to exceed 24 inches may be varied to suit door height.
4. Install glazing panels where indicated using rubber thermal break gaskets standard with door manufacturer.
5. Insulation shall have a flame spread rating of not more than 25 and a smoke development factor of not more than 50 when tested in accordance with ASTM E 84.
6. Reinforced for hardware anchorage with not less than 10 gage galvanized steel.

B. Tracks:
1. Manufacturer's standard formed of galvanized steel.
2. Minimum of 14 gage for 2 inch tracks and 12 gage for 3 inch tracks.
3. Vertical tracks fabricated with adjustable brackets for mounting at incline to continuous steel angle wall bracket.
4. Horizontal track: Reinforce with continuous steel angle anchored to vertical steel angle wall bracket and to ceiling angle supports. Use vertical and cross or diagonal braced to obtain rigid installation of horizontal track.
5. Use not less than 13 gage galvanized steel angles.

C. Hardware:
1. Manufacturers standard hinges, brackets, rollers, locking devices and other hardware required for a complete installation.
2. Hinges and roller brackets minimum of 13 gage galvanized steel.
3. Use rollers with ball bearings and case hardened races.
4. Positive locking device to receive cylinder lock, specified in Section 08 71 00, DOOR HARDWARE, with interlocking switch to motor operator.

2.4 ELECTRIC MOTOR OPERATORS:

A. 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 for motor removal 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 in case of electrical failure.
3. Arrange the emergency manual operating mechanism to immediately be put into and out of operation from the floor with a mechanical device to disconnect the motor from the operating mechanism when the emergency manual operating mechanism is engaged and not affect the timing of the limit switches.
4. Provide interlock with motor to prevent motor from operating when manual locks are activated.

C. Motors:
1. Motor conform to NEMA MG 1, maximum operation 3600 rpm.
2. Suitable for operation on current specified in Division 26, ELECTRICAL.
3. Use high starting torque, reversible type, of sufficient horsepower and torque output to move the door in either direction from door position, and produce door travel speed range of 8 to 12 inches per second, without exceeding the rated capacity.
4. Single-phase motors shall not have commutation or more than one starting contact.
5. Motor Enclosures: Drip proof type or NEMA TENV type.

D. Controls:
1. Control equipment: NEMA 2.
2. Control enclosures: NEMA ICS 6, Type 12 or Type 4, except that contractor enclosures may be Type 1. Use weatherproof corrosion-resistant covers for exterior locations.
3. At door motors use an enclosed, across-the-line type, magnetic reversing contactor, thermal overload protection, solenoid operated brake, limit switches, and remote control switches at locations indicated.
4. Control switches:
   a. Three push button type on interior, unless noted to be key activated.
   b. Buttons marked, OPEN, CLOSE and STOP.
   c. The OPEN and STOP buttons: Momentary pressure or contact type.
   d. The CLOSE button: Constant pressure type.
   e Limit switches: Manufacturers standard, position of switches readily adjustable.

5. Radio Controls: Provide 3 button radio transmitter to provide open, close, stop functionality.
   a. Provide external antenna and coaxial wiring to receiver to enhance radio control reception.
6. Operation:
   a. Open door upon activation of Open switch.
   b. Close door only when constant pressure applied.
   c. When the door is in motion, and the STOP button is pressed, door shall stop instantly and remain in the stop position; from stop position, door may be operated in either direction by OPEN or CLOSE button.
   d. Limit switches automatically stop doors at their fully open and closed positions.
7. Push buttons full-guarded to prevent accidental operation.
8. Transformer:
   a. Use a control transformer in power circuits to reduce the voltage on control circuits to 120 volts or less.
   b. Conform to NEMA ST 20.
9. Electrical Components: Conform to NFPA 70.
10. Safety Devices:
    a. Bottom door edge weather-strip safety device to immediately stop and reverse the door closing to full open position upon contact with an obstruction. Door is to open upon failure of device, component of device or component of control system.
    b. The door closing circuit shall be electrically locked out and door to remain capable of manual operation until the failure or damage has been corrected.
    c. Do not use as a limit switch.
    d. Safety device connecting cable to motor to be flexible type SO cable with spring loaded automatic take up reel or equivalent
    e. Photo-electric control: Provide each motorized door with a photo-electric device that will stop and reverse the downward door travel if the light beam is broken or blocked. Device shall be:
       (1) NEMA Type 1.device, as required for proper operation of the doors.

2.5 FINISHES:

A. Steel:

1. Comply with NAAMM's Metal Finishes Manual.
2. Clean surfaces free of scale, rust, oil and grease.
3. Non-galvanized steel: Pretreatment to assure maximum paint adherence.
4. Galvanized steel: Apply phosphate treatment.
5. Apply shop prime coat of corrosion inhibitive paint on exposed surfaces after fabrication.
6. Apply finish paint on color scheduled when specified in Section 09 06 00, SCHEDULE FOR FINISHES.
7. Do not paint track, rollers, hinges, or locks.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install in accordance with approved shop drawings and manufacturer's instructions. For electrical work, see Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS; Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.

B. Locate anchors and inserts for tracks, brackets, motors, switches, hardware, and other accessories accurately.

C. Securely attach tracks to adjoining construction with not less than 3/8 inch diameter bolts, spaced near each end and not over 24 inches apart.

D. Locate control switches where shown at least five feet above the floor line so that the operator will have complete visibility of the door.

E. Lubricate, properly adjust and demonstrate door to operate freely.

F. Upon completion, door openings shall be weathertight and doors shall be free from warp, twists, or distortion.

3.2 REPAIR:

A. Repair zinc-coated surfaces both bare and painted, by the application of galvanizing repair compound.

B. Spot prime and apply finish paint to all repairs.

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SECTION 08 41 02
INTERIOR ALUMINUM FRAMING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Aluminum framing systems

1.2 SUBMITTALS

A. Submit shop drawings indicating size, shape, and type of aluminum members, glazing, blocking, sealants, tapes, gaskets, and associated items utilized in the installation of aluminum frames and relation of assemblies to adjacent building components.

B. Submit samples of corner construction for frame, approximately 12" long on each leg.

C. Submit representative finish samples of production items indicating full range of color tolerance for selection by the Architect. Samples shall be large enough to allow good comparison.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers:

1. Wausau
2. EFCO
3. Moduline
4. Owner approved equivalent

2.2 MATERIALS

A. Aluminum Frames and Related Fixed Glass Sections:

1. Aluminum:
   a. Extruded 6063-T5 or 6063-T6 type aluminum alloy adapted as necessary to match color finish selected by Architect.
   b. Thicknesses, minimum:
      1) 0.125" main door aluminum members.
      2) 0.050" glass stops
2. Framing members:
   a. Shall provide for glazing with no projecting stops.
   b. Flashing shall be two-part incorporating thermal barrier exterior aluminum sections.
   c. Vertical and horizontal framing members: approximately 2” x 6”, within ½”
3. Joints: Butted, mechanically reinforced and anchored. Corners are

to be mitered with outside corners eased.

4. Fasteners: Screws, miscellaneous fastening devices and internal components shall be stainless steel, cadmium plated or corrosion resistant materials.
5. All portions of frame which will contact masonry shall be factory coated with bituminous paint.
6. Glass: Types as indicated. Refer to Section 08 80 00 - GLAZING.
7. Color and finish of installed materials shall fall within range samples reviewed by Architect.
8. Basis of design: Kawneer "Trifab 400"
9. Recycled Content: 40% Minimum.

B. Glazing:

1. Glass and panels shall be installed and glazed from interior of building. Snap-on glass stops shall be used with no exposed screws.
2. Setting blocks, spacers, and clips shall be provided as necessary to meet glass manufacturer's requirement, recommendations of FGMA Glazing Manual.
3. Glass type as scheduled.

2.3 FINISHES

A. Class I, Clear Anodic Finish: AA-M12C22A41(Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Erect work plumb, level, true-to-line and secure in accordance with instructions of manufacturer. Provide joint clearances to allow for expansion. Door to door frame tolerance of 1/8" shall be rigidly maintained.

B. Anchoring devices shall be aluminum, stainless steel, or other noncorrosive materials not harmful to aluminum. Steel anchors may be used provided they are properly insulated. Paint for shop coating and field touch-up of dissimilar metal connecting members including anchors and clips, shall be alkali resistant bituminous paint.

C. Where type, size, or spacing of fastening for securing material

to building construction is not indicated, use expansion or toggle bolts or screws as required by building construction material. Such bolts or screws shall not be less than 1/4" diameter spaced 24" on center.

3.2 CLEANING

A. Aluminum shall be left clean and unmarred, protected from damage during subsequent construction operations.

B. After installation has been completed and prior to final inspection, wash all aluminum work with a non-alkali soap and water solution. Follow with a clear water rinse. Refinish where necessary, replace damaged parts, and leave in complete and finished condition.

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SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies aluminum entrance work including storefront construction, hung doors and other components to make a complete assembly.

1.2 RELATED WORK:

A. Glass and Glazing: Section 08 80 00, GLAZING.

B. Hardware: Section 08 71 00, DOOR HARDWARE.

C. Texture and color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: (1/2 full scale) showing construction, anchorage, reinforcement, and installation details.

C. Manufacturer’s Literature and Data:

1. Doors, each type.
2. Entrance and Storefront construction.

D. Samples:

1. Two samples of anodized aluminum of each color showing finish and maximum shade range.

E. Manufacturer's Certificates:

1. Stating that aluminum has been given specified thickness of anodizing.
2. Indicating manufacturer's qualifications specified.

1.4 QUALITY ASSURANCE:

A. Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.

B. Certify manufacturer regularly and presently manufactures aluminum entrances and storefronts as one of their principal products.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver aluminum entrance and storefront material to the site in packages or containers; labeled for identification with the manufacturer's name, brand and contents.

B. Store aluminum entrance and storefront material in weather-tight and dry storage facility.

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. 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

E283-04.....Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E331-00(R2009).....Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs

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

AMP 500 Series.....Metal Finishes Manual

D. American Architectural Manufacturer's Association (AAMA):

2604-10.....High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels

E. American Welding Society (AWS):

D1.2-08.....Structural Welding Code Aluminum

1.7 PERFORMANCE REQUIREMENTS:

A. Shapes and thickness of framing members shall be sufficient to withstand a design wind load of not less than 30—pounds per square foot of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65 (applied to overall load failure of the unit). Provide glazing beads, moldings, and trim of not less than 0.050 inch nominal thickness.

B. Air Infiltration: When tested in accordance with ASTM E 283, air infiltration shall not exceed 0.06 cubic feet per minute per square foot of fixed area at a test pressure of 6.24 pounds per square foot 50 mile per hour wind.

C. Water Penetration: When tested in accordance with ASTM E 331, there shall be no water penetration at a pressure of 8 pounds per square foot of fixed area.

D. Color Anodized Finish: Match existing anodized aluminum storefront finish.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum, ASTM B209 and B221:

1. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights, storefronts and transoms.

B. Thermal Break: Manufacturer standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.

C. Fasteners:

1. Aluminum: ASTM F468, Alloy 2024.
2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.

2.2 FABRICATION:

A. Fabricate doors, of extruded aluminum sections not less than 0.125 inch thick. Fabricate glazing beads of aluminum not less than 0.050 inch thick.

B. Accurately form metal parts and accurately fit and rigidly assemble joints, except those joints designed to accommodate movement. Seal joints to prevent leakage of both air and water.

C. Make welds in aluminum in accordance with the recommended practice AWA D1.2. Use electrodes and methods recommended by the manufacturers of the metals and alloys being welded. Make welds behind finished surfaces so as to cause no distortion or discoloration of the exposed side. Clean welded joints of welding flux and dress exposed and contact surfaces.

D. Make provisions in doors and frames to receive the specified hardware and accessories. Coordinate schedule and template for hardware specified under Section 08 71 00, DOOR HARDWARE.

E. Fit and assemble the work at the manufacturer's plant. Mark work that cannot be permanently plant-assembled to assure proper assembly in the field.

2.3 PROTECTION OF ALUMINUM:

A. Isolate aluminum from contact with dissimilar metals other than stainless steel, white bronze, or zinc by any of the following:
   1. Coat the dissimilar metal with two coats of heavy-bodied alkali resistant bituminous paint.
   2. Place caulking compound, or non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
   3. Paint aluminum in contact with mortar, concrete and plaster, with a coat of aluminum paint primer.

2.4 FRAMES:

A. Fabricate doors, frames, mullions, transoms, frames for fixed glass and similar members from extruded aluminum not less than 0.125 inch thick.
B. Provide integral stops and glass rebates and applied snap-on type trim.
C. Use concealed screws, bolts and other fasteners. Secure cover boxes to frames in back of all lock strike cutouts.
D. Fabricate framework with thermal breaks in frames where insulating glass is scheduled and specified under Section 08 80 00, GLAZING.

2.5 STILE AND RAIL DOORS:

A. Nominal 1-3/4 inch thick, with stile and head rail 3-1/2 inches wide, and bottom rail 10 inches wide.
B. Bevel single-acting doors 1/8 inch at lock, hinge and meeting stile edges. Provide clearances of 1/16 inch at hinge stiles, 1/8 inch at lock stiles and top rails, and 3/16 inch at floors and thresholds. Form glass rebates integrally with stiles and rails. Glazing beads may be formed integrally with stiles and rails or applied type secured with fasteners at six inches on centers.
C. Construct doors with a system of welded joints or interlocking dovetail joints between stiles and rails. Clamp door together through top and bottom rails with 3/8 inch primed steel rod extending into the stiles, and having a self-locking nut and washer at each end. Reinforce stiles and rails to prevent door distortion when tie rods are tightened. Provide a compensating spring-type washer under each nut to take up any stresses that may develop. Construct joints between rails and stiles to remain rigid and tight when door is operated.

D. Weather-stripping: Provide removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder. Make slots for applying weather-stripping integral with doors and door frame stops. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames. Install weather-stripping so doors can swing freely and close positively.

2.6 REINFORCEMENT FOR BUILDERS HARDWARE:

A. Fabricate from stainless steel plates.

B. Hinge and pivot reinforcing: 0.1793 inch thick.

C. Reinforcing for lock face, flush bolts, concealed holders, concealed or surface mounted closers: 0.1046 inch thick.

D. Reinforcing for all other surface mounted hardware: 0.0598 inch thick.

2.7 COLUMN COVERS AND TRIM

A. Fabricate column covers and trim shown from 0.0625 inch thick sheet aluminum of longest available lengths.

B. Use concealed fasteners.

C. Provide aluminum stiffener and other supporting members shown or as required to maintain the integrity of the components.

2.8 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

1. Color Finish: Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 7 mils thick. More than 50 percent variation of the maximum shade range approved will not be accepted in a single component or in adjacent components, stiles, and rails on a continuous series.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Allowable Installation Tolerances: Install work plumb and true, in alignment and in relation to lines and grades shown. Variation of 1/8 inch in eight feet, non-accumulative, is maximum permissible for plumb, level, warp, bow and alignment.

B. Anchor aluminum frames to adjoining construction at heads, jambs and bottom and to steel supports, and bracing. Anchor frames with stainless steel or aluminum countersunk flathead, expansion bolts or machine screws, as applicable. Use aluminum clips for internal connections of adjoining frame sections.

C. Where work is installed within masonry or concrete openings, place no parts other than built-in anchors and provision for operating devices located in the floor, until after the masonry or concrete work is completed.

D. Install hardware specified under Section 08 71 00, DOOR HARDWARE.

E. Install hung door operators specified under Section 08 71 00, DOOR HARDWARE.

3.2 ADJUSTING:

After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to insure proper performance.

3.3 PROTECTION, CLEANING AND REPAIRING:

Remove all mastic smears and other unsightly marks, and repair any damaged or disfiguration of the work. Protect the installed work against damage or abuse.

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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 system to include following:
      a. Glass.
      b. Integral reinforcing.
      c. Closures, trim, subsills and flashings.
      d. Fasteners, anchors, and related reinforcement.

1.2 RELATED WORK

A. Structural steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
B. Miscellaneous metal members: Section 05 50 00, METAL FABRICATIONS.
C. Metal Wall Panels: Section 07 42 19, METAL PLATE WALL PANELS.
D. Firestopping between curtain wall and structure: Section 07 84 00, FIRESTOPPING.
E. Sheet metal flashing and trim: Section 07 60 00, FLASHING AND SHEET METAL.
   a. Joint sealants: Section 07 92 00, JOINT SEALANTS.
F. Aluminum and glass hinged entry doors and storefront construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
G. Aluminum windows: Section 08 51 13.11, SIDE-HINGED ALUMINUM WINDOWS.
H. Louvers and wall vents: Section 08 90 00, LOUVERS AND VENTS.

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 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, 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 12-inch long section by width of each tubular, or extruded shape section or 12-inch by 12-inch wide sections of sheet shapes.
2. 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 Fenestration Products
TIR A8-08.....Structural Performance of Composite Thermal Barrier Framing Systems
TIR A9-91.....Metal Curtain Wall Fasteners
TIR A11-04.....Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads
101/I.S.2/A440-08.....Windows, Doors and Unit Skylights
501-05.....Methods of Test for Exterior Walls
503-08.....Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems
2605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels
1503-09.....Thermal Transmission and Condensation Resistance of Windows, Doors and Glazed Wall Sections

C. American National Standards Institute (ANSI):

Z97.1-09.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

D. American Society of Civil Engineers (ASCE):

ASCE 7-10.....Minimum Design Loads for Buildings and Other Structures

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

A36/A36M-08.....Structural Steel

A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A193-10.....Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service

A307-10.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

B209-10.....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-10.....Aluminum and Aluminum Alloy Rivet and Cold-Heading, Wire, and Rods

C578-10.....Rigid Cellular Polystyrene Thermal Insulation

C612-10.....Mineral Fiber Block and Board Thermal Insulation

C920-11.....Elastomeric Joint Sealants

C794-10.....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

D1037-06.....Evaluating the Properties of Wood-Base Fibers and Particle Panel Materials

E84-10.....Surface Burning Characteristics of Building Materials

E90-09.....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(R2010).....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

E331-00(R2009).....Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference

E413-10.....Classification for Rating Sound Insulation

E783-02(R2010).....Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

E1105-00(R2008).....Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors By Uniform or Cyclic Static Air Pressure Differences

F. American Welding Society, Inc. (AWS):

D1.2-08.....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):

2010 Edition.....GANA Glazing Manual

2008 Edition.....GANA Sealant Manual

2009 Edition.....GANA Laminated Glazing Reference Manual

2008 Edition.....Tempered Glass Engineering Standard Manual

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 Series (2006).....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”, 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, vision glass, related flashings, anchorage and attachment devices.
2. System Assembly: Shop unitized assembly.
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 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 gypsum wallboard 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 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 ASCE 7-Minimum Design Loads for Buildings and Other Structures to a design pressure of 30 lb/sq ft. as measured in accordance with ASTM E330.
   4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with International Building Code.
   5. 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 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.
   6. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783
      a. Static-Air-Differential: 1.57 lbf/sq. ft. minimum.
      b. Air Leakage: 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 1/8 inch; clearance between member and an operable window or door shall be minimum 1/16 inch.
   8. 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 a U-value of 0.38 BTU/sq.ft. x h x deg F.

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 0.062 inch thick aluminum, in finish as selected.
2. Extruded sill members: Minimum 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: 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 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.

I. Louvers:

1. As specified under Section 08 90 00, LOUVERS AND VENTS.

J. Louver Screening:

1. As specified under Section 08 90 00, LOUVERS AND VENTS.

K. 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 1/16" 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.

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 FINISHES

A. In accordance with NAAMM AMP500 series.

B. Anodized Aluminum:

1. AA-C22A44 Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class 1 Architectural, 0.7-mil thick finish. Dyes will not be accepted.
   a. Dark bronze.

C. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 2.0 oz/sq ft. Primed with iron oxide paint.

D. Apply one coat 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 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: 1/8 inch per 12 feet of length up to not more than 1/2 inch in any total length.
2. Maximum offset from true alignment between two identical members abutting end to end in line: 1/32 inch.
3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 3/4 inch and minimum of 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 1/8 inch. Do not apply compound unless ambient temperature is between 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 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.

J. 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.

K. Metal Copings:

1. Refer to Section 07 60 00, FLASHING AND SHEET METAL for requirements of metal copings when they are not a part of glazed curtain wall system work.
2. Coordinate curtain wall installation with metal coping detail on contract drawings. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

3.4 ADJUSTING

A. Adjust windows, doors to provide a tight fit at contact points and operate easily.

B. Adjust weather-stripping to make even contact with surfaces.

C. Adjust operating hardware and moving parts.

3.5 CLEANING

A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.

B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.

C. Remove excess glazing and sealant compounds, dirt, and other substances.

D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.

E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint spots, compounds, and other defacements, and clean metal fixed panels. Remove and replace components that cannot be cleaned successfully.

3.6 DEMONSTRATION, TESTING, AND ACCEPTANCE

A. Instruct Owner's personnel in proper operation and maintenance of windows. Train personnel in procedures to follow in event of operational failures or malfunctions.

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.

- - - END - - -

SECTION 08 51 13.11

SIDE-HINGED ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Side hinged, in-swing casement type, double glazed windows with a venetian blind enclosed between the glass.

B. Windows to be complete, with hardware, related components and accessories.

1.2 DEFINITIONS

A. Accessories: Mullions, closures, trim, clips, anchors, fastenings, weather-stripping, and other necessary components required for the fabrication and installation of the 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. Glazing: Section 08 80 00, GLAZING.

B. Color of Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Field Painting: Section 09 91 00, PAINTING.

1.4 PROTECTION

A. Protect windows from damage from handling, and construction operations before, during and after installation.

B. Store windows under cover, setting upright. Do not stack windows flat. 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 manufacturer, suppliers and installers.

B. Approval will be based upon submission of certification by the Contractor that:

1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
2. The manufacturer shall instruct the installer in installation methods and shall certify that the installation is as per manufacturer’s installation procedures. Certification is not required if installation is done by a certified installer.

C. Test Units:

1. All test units to shall be constructed in strict accordance with the drawings and specifications.

2. Minimum test size of specimen to be four feet wide by six feet high for thermal test and as per AAMA 101-I.S.2 for the window type selected for air, water, structural and life cycle testing.

D. Performance Requirements:

1. AAMA/WDMA/CAS 101-I.S.2 for SD-AW40, side Hinged Windows.
2. Condensation Resistance Factor (CRF): CRF Class 45.
3. Thermal Transmittance: U valve 0.38 (Zone 5) or per ASHRAE 189.1.
4. Solar Heat Gain Coefficient (SHGC): ASHRAE 189.1.
5. Submit copies of test reports from an independent testing laboratory accredited by AAMA and certificates signed by the window supplier or manufacturer stating that the windows delivered to the site comply with all specified performance requirements, within size and variables.
6. Quality Certified Labels or Certificate:
   a. Architectural Aluminum Manufacturer Association, “AAMA label” affixed to each window indicating compliance with specification.
   b. Certificates in lieu of label with copy of recent test report (not more than four years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA/WDMA/CAS 101/I.S.2 for type of window specified.

1.6 FIELD TESTING

A. Test Method: AAMA 502.

B. Test Specimen:

1. Test specimen shall include the window assembly and construction. The test chamber shall be affixed to the interior side of the test specimen and the test shall be conducted using positive static air pressure (Test method A).
2. Test specimens shall be selected by the Project Manager after windows have been installed in accordance with the drawings and specification.

C. 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 Project Manager for approval.

D. Number of Test Specimens: Two tests for first 100 windows.

E. Requirements:

1. Air Infiltration: Not more than 1.5 times the amount specified for the windows only.
2. Water Infiltration: No uncontrolled water shall be present at the specified test pressure.

F. Retesting:
1. Should any of the specimens fail the field test, the specimens may be modified or repaired, and retested.
2. Should any of the specimens fail the second field test, the specimens may be additionally modified or repaired, and retested.
3. All modifications and repairs made to the specimens shall be recorded, and the same modifications and repairs made to all the windows and adjacent construction on the project.
4. Should the second test fail, the Project Manager may require two additional windows and their adjacent construction to be tested.

G. Rejection: Failure of any of the specimens to meet the test requirements of the third test shall be cause for rejection of all windows and adjacent construction on the project.

1.7 SUMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:
1. Provide two six-inch length samples of color anodized aluminum showing finish and maximum shade range proposed for use on the windows.
2. Variation of more than 50 percent of the maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.

C. Shop Drawings:
1. Identifying all window parts by name, kind of metal and material, and showing details of construction, installation and anchorage.
2. Details of metal trim, including anchorages.

D. Test Reports and Manufacturer’s Certificates:
1. Manufacturers and Installers qualifications as specified.
2. Certified labels or certificate as specified under Performance Requirements.
3. Certification of the type and thickness of finish.

1.8 WARRANTY

Windows including thermal barrier shall be warranted against malfunctions due to defects in materials and workmanship, and shall be subject to the terms of Article "Warranty of Construction", except that the warranty period shall be ten years.

1.9 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to by the basic designation only.

B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):

189.1-06.....Design of High-Performance Green Buildings

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

A653/A653M-09.....Steel Sheet, Zinc-Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

D. American Society of Civil Engineers (ASCE):

7-05.....Minimum Design Loads for Buildings and Other Structures

E. American Architectural Manufacturers Association/Window and Door Manufacturers Canadian Standards Association (AAMA/WDMA/CAS Association (AAMA/NWWDA):

101/I.S.2/A440-08.....Windows, Doors and Skylights

F. American Architectural Manufacturers Association (AAMA):

TIR-A8-04.....Structural Performance of Composite Thermal Barrier Framing Systems

502-08.....Field Testing of Newly Installed Fenestration Products.

505-09.....Dry Shrinkage and Composite Performance thermal Cycling Test Procedures

2605-05.....Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels.

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

AMP 500 Series.....Metal Finishes Manual

H. National Fenestration Rating Council (NFRC):

100-04 (E1-07).....Determining Fenestration Product U-Factors

200-04 (E1-07).....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

500-04.....Determining Fenestration Product Condensation Resisting Rating Values

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: AAMA/WDMA/CAS 101-I.S.2.

B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.

C. Fastenings: 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 0.125-inch thick, provide backup plates or similar reinforcements for fasteners.
2. Stainless steel self tapping screws may be used to secure venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.
3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 0.125-inch thick.

D. Weather-strips: AAMA/WDMA/CAS 101-I.S.2.

2.2 VENETIAN BLINDS

A. Slats shall be tempered aluminum with baked-on acrylic finish. For color, see Section 09 06 00, SCHEDULE FOR FINISHES Slats shall be maximum one inch wide. Weave cords and tapes of polyester-dacron fiber. Mount blinds in the sash head so that they may be removed for maintenance without tools.

B. Angle of slat tilt shall be adjustable from the room side by means of a nonremovable control knob, having cable or gear drive with slip mechanism.

2.3 GLAZING

A. Glaze in accordance with Section 08 80 00, GLAZING.

B. Install removable glazing beads on the venetian blind side of the sash so as to be inaccessible to patients.

2.4 HARDWARE

A. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than five feet from floor level. Locate locking devices in the vent side rail. Fastenings for locks and keepers shall be concealed or nonremovable.

B. Locking Device Strikes: Locate strikes in frame jamb. Strikes shall be adjustable for locking tension. Fabricate strikes from Type 304 stainless steel or white bronze.

C. Fabricate hinges of noncorrosive metal. Hinges may be either fully concealed when window is closed or semi-concealed with exposed knuckles. All exposed knuckle hinges shall have hospital tips, at both ends. Surface mounted hinges will not be accepted.

D. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.

E. Hardware for Emergency Ventilation of Windows:

1. Provide windows with a hold open linkage for emergency ventilation.
2. Hold open hardware shall provide for maximum 150 mm (6 inch) of window opening and shall include an adjustable friction shoe to provide resistance when closing the window.
3. Handles shall be removable.

F. Hardware for Maintenance Opening of Windows: Opening beyond the 6 inch position shall be accomplished with a window washers key. The release device shall capture the key when window is in the open position.

G. Provide six (6)loose window handles and six (6) window washers keys.

H. Design operating device to prevent opening with standard tools, coins or bent wire devices.

2.5 FABRICATION

A. Meet or exceed performance requirements of AAMA/WDMA/CAS 101-I.S.2 for SHW-AW40 windows, and additional requirements as specified.

B. Sizes and Profiles: Required sizes and profile requirements are shown on the drawings.

C. Sash of window shall be side hinged for casement operation. Sash shall be provided with access to blinds and inner surfaces of glass.

D. Thermal-Break Construction:

1. Manufacturer’s Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.

4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage & Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Provide baffled weep holes and internal water passages to conduct infiltrating water to the exterior.

F. Weather-stripping: Provide primary weather-stripping around exterior perimeter of the sash. Provide secondary weather-stripping located at the thermal barrier between the two frames to seal against the perimeter of the inner vent. Weather-stripping to be in compression when the sash is in a locked closed position.

G. Miter all corners, internally heat weld or mechanically crimp to reinforcing bar and cement with epoxy adhesive to develop full strength of section, with airtight and watertight joints.

2.6 CLOSURES, TRIM, MULLIONS AND SUBSILLS, GENERAL

Closures, mullions and trim shall be extruded aluminum, at least 0.062-inch thick, except stools shall be 0.080-inch thick.

2.7 CLOSURES

Closures shall have external corners mitered and internal corners coped, fitted with hairline, tightly closed joints. Secure closures to window frames with machine screws or expansion rivets, and to masonry with anchor bolts, power actuated drive pins, or expansion rivets.

2.8 TRIM

A. Fit heads, jambs (including reveals of opening) and stools, with hairline mitered corners, dressed flush and smooth. Trim shall have flanges expanded or perforated for plaster keying and attachments for anchorage. Slightly round exposed edges.

B. Secure trim to concrete or 100 percent solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or power actuated drive pins; strap-anchored or toggle bolted to hollow masonry units, screwed to wood or metal. Except for strap anchors, fastenings shall occur near the ends and corners of the trim, and at a spacing of not more than 12 inches in between.

2.9 MULLIONS

AAMA/WDMA/CAS 101-I.S.2

2.10 SUBSILLS

Extruded aluminum, minimum 0.080-inch thick.

2.11 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

1. AA-C22A44 Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish. Dyes will not be accepted.

C. Hardware: Finish hardware exposed when window is in the closed position shall match the window color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set, windows in masonry walls during progress of the work. If windows are not delivered to job in time for installation in prepared openings, make provision for later installation. Set windows in cast-in-place concrete in prepared openings.

B. Provide necessary anchorage when installed in prepared openings. Set windows plumb, true and in alignment. Anchor windows on four sides with anchor clips or fin trim. Make connections to allow for thermal and other movements. No load shall be allowed to bear on windows.

3.2 MATERIAL ISOLATION

A. Isolate aluminum surfaces (including anchorages) that will come in contact with steel, steel sub-frames or concrete, by giving steel or concrete a heavy coat of alkali resisting bituminous paint.

B. Isolate the aluminum from plaster and masonry by coating aluminum with bituminous paint.

3.3 ADJUSTING

Adjust movable sash, hardware, and equipment to operate easily and properly, and be free of defects before acceptance of the work.

3.4 PROTECTION

Except when a window is being adjusted or tested, lock all windows set in place in the closed position during the progress of the work. Protect interior and exterior faces of windows.

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SECTION 08 56 19
PASS WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies sliding glass counter mounted pass windows.

1.2 RELATED WORK

A. Color of factory finish: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Glass and Glazing: Section 08 80 00, GLAZING.

1.3 APPLICABLE PUBLICATIONS

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

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

B221/221M-08.....Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Shapes and Tubes (Metric)

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material

C. American Society of Mechanical Engineers (ASME):

B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

D. Master Painters Institute (MPI):

MPI #18.....Organic Zinc Rich Coating

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

AMP 500 Series.....Metal Finishes Manual

AMP 500.....Introduction to Metal Finishing

AMP 501.....Finishes for Aluminum

PART 2 - PRODUCTS

2.1 MATERIAL

A. Aluminum Extrusions:

1. ASTM B 221 M.
2. Alloy and temper recommended by window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength, and yield of 16,000 psi.
3. Aluminum alloy used for colored anodic coating as required to produce specified color.

B. Paint: MPI #18.

C. Glazing Gaskets: ASTM C 509.

2.2 SLIDING GLASS PASS WINDOWS, COUNTER MOUNTED

A. Fabricate sliding glass sash and frames of extruded aluminum with corners mitered.

B. Fabricate sash to receive 1/4 inch thick glass.

C. Fabricate sliding sash of "H" channel molding at bottom edges including concealed nylon rollers at bottom set on track and guides at top set into track.

D. Provide sash with pin tumbler lock and two keys.

E. Provide sash with finger slot on vertical edge.

F. Fabricate frame with channel sash slot, bottom roller track, and top guides.

G. Sash may be factory or field glazed using glazing gaskets.

H. Use concealed screws in assembly.

I. Finish:

1. Comply with NAAMM AMP 500 Series.
2. Clear anodic coating, Class II Architectural 0.4 mills thick, AA-C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in pass window opening level and plumb.

B. Secure with screws to opening; ASME B18.6.4.

1. Screw within 4 inches of ends.
2. Space screws not over 24 inches between end screws.

C. Coat aluminum in contact with steel with one coat of MPI No. 18.

D. Clean unit of dust and markings.

3.2 OPERATION

A. Adjust to roll smoothly and stay in position where stopped.

B. Demonstrate to Project Manager operation and locking.

C. Turn keys with key tags over to Project Managers.

- - E N D - - -

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

B. Application of Hardware: Section 08 14 00, WOOD DOORS; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Section 08 41 13

C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Painting: Section 09 91 00, PAINTING.

E. Electrical: Division 26, ELECTRICAL.

F. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS.

D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

E. The following items shall be of the same manufacturer, except as otherwise specified:

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.
4. Exit devices.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of "Warranty of Construction", except that the Warranty period shall be two years in lieu of one year for all items except as noted below:

1. Locks, latchsets, and panic hardware: 5 years.
2. Door closers and continuous hinges: 10 years.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an

independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Project Manager for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Project Manager's office until all other similar items have been installed in project, at which time the Project Manager will deliver items on file to Contractor for installation in predetermined locations on the project.

B. All keys and cores shall be sent directly to the VA locksmith: Iowa City VA Healthcare System, Attention – Dave Warden, 601 Highway 6 West, Iowa City, IA 52246.

1.8 PREINSTALLATION MEETING

A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Manager and VA Locksmith, Hardware Consultant, and Hardware Manufacturer’s Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.
6. Installation.
7. Adjusting.
8. Repair.
9. Field quality control.
10. Cleaning.

1.9 INSTRUCTIONS

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a

number. Each number designates a set of hardware items applicable to a door type.

B. Keying: All cylinders shall be keyed into existing Best CorMax x9W Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the VA Locksmith.

C. Cores shall be combinated at the manufacturer per VA requirements. Two (2) keys per core shall be cut for the new keyway. All keys and cores shall be sent directly to the VA Locksmith and shall **NOT** be delivered to the Contractor.

1.10 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

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

F883-04.....Padlocks

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....Butts and Hinges

A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts

A156.4-08.....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

A156.12-05 .....Interconnected Locks and Latches

A156.13-05.....Mortise Locks and Latches Series 1000

A156.14-07 .....Sliding and Folding Door Hardware

A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical

A156.16-08.....Auxiliary Hardware

A156.17-04 .....Self-Closing Hinges and Pivots

A156.18-06.....Materials and Finishes

A156.20-06 .....Strap and Tee Hinges, and Hasps

A156.21-09.....Thresholds

A156.22-05.....Door Gasketing and Edge Seal Systems

A156.23-04.....Electromagnetic Locks

A156.24-03.....Delayed Egress Locking Systems

A156.25-07 .....Electrified Locking Devices

A156.26-06.....Continuous Hinges

A156.28-07 .....Master Keying Systems

A156.29-07 .....Exit Locks and Alarms

A156.31-07 .....Electric Strikes and Frame Mounted Actuators

A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Fire Windows

101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 HARDWARE

A. Provide items as listed in schedule at end of this Section complete to function as intended.

2.2 FINISH

A. Finish as shown on Hardware Schedule and complying with ANSI A156.18.

2.3 ACCEPTABLE MANUFACTURERS

	Item	**Manufacturer**	**Acceptable Substitutes**
A.	Hinges	Stanley	Hager, Ives, McKinney
B.	Locks, Latches	Yale	No substitute
C.	Pushbutton Locks	Kaba Illco	Schlage CO lock
D.	Exit Devices	Von Duprin	Precision, Falcon
E.	Closers	LCN	Sargent, Corbin-Russwin
F.	Auto operators	Stanley	LCN, Horton

G.	Flush Bolts	Ives	Trimco, Quality
H.	Stops	Ives	Trimco, Quality
I.	Overhead Stops	Glynn-Johnson	ABH, Rixson
J.	Seals & Bottoms	Reese	National Guard, Pemko
K.	Magnetic Locks	DynaLock	Schlage Electronics
L.	Cylinder, core and key	Best CoreMax	by the Contractor

2.4 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless steel material.
2. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.

B. Provide quantity and size of hinges per door leaf as follows:

1. Doors up to 1210 mm (4 feet) high: 2 hinges.
2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
7. Provide heavy-weight hinges where specified.

8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.5 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer for each type specified.

2.6 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.

B. Closers shall conform to the following:

1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
2. Where specified, closer shall have hold-open feature.
3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.

10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½" (38mm) minimum piston diameter.

2.7 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. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.

E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.

F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.

G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.

J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.

K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.

L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.8 OVERHEAD DOOR STOPS AND HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.9 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.10 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer’s fire label. Provide temporary keying device or construction core 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 fabricated from cast stainless steel. Provide sectional (lever x rose) lever design matching existing building design. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.
2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Provide lever design to match design selected by Architect or to match existing lever design. Where two turn pieces are specified for lock F76, turn piece on inside knob shall lock and unlock inside knob, and turn piece on outside knob shall unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)
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.
5. Privacy locks in non-mental-health patient rooms shall have an inside thumbturn for privacy and an outside thumbturn for emergency

entrance. Single occupancy patient privacy doors shall typically swing out; where such doors cannot swing out, provide center-pivoted doors with rescue hardware (see HW-2B).

2.11 PUSH-BUTTON COMBINATION LOCKS

A. ANSI/BHMA A156.13, Grade 1. Battery operated pushbutton entry.

B. Construction: Heavy duty mortise lock housing conforming to ANSI/BHMA A156.13, Grade 1. Lever handles and operating components in compliance with the UFAS and the ADA Accessibility Guidelines. Match lever handles of locks and latchsets on adjacent doors.

C. Special Features: Key override to permit a master keyed security system and a pushbutton security code activated passage feature to allow access without using the entry code.

2.12 KEY CABINET

A. ANSI Standard A156.5. Provide key cabinet made of cold rolled, 1.2 mm (0.0478 inch) thick furniture steel electro-welded. Doors shall have "no sag" continuous brass-pin piano type hinge and be equipped with chrome plated locking door handles, hook cam and mechanical pushbutton door lock. Key Cabinet and Key Control System shall accommodate all keys for this project plus 25 percent. Provide minimum number of multiple cabinets where a single cabinet of largest size will not accommodate the required number of keys.

B. Key tags shall consist of two sets: Permanent self-locking and loan key snaphook type with tag colors as follows: Red fiber marker of the permanent self-locking type approximately 32 mm (1-1/4 inch) in diameter engraved with the legend "FILE KEY MUST NOT BE LOANED." Also furnish for each hook a white cloverleaf key marker with snap-hooks engraved with the legend "LOAN KEY."

C. The manufacturer of the lock cylinders and locks shall attach a key tag to keys of each lock cylinder and shall mark thereon the respective item number and key change number. Provide each group of keys in a key gathering envelope (supplied by Key Cabinet Manufacturer) in which the lock manufacturer shall include the following information: Item number, key change number and door number. The contractor shall furnish the Key Cabinet Manufacturer the hardware and keying schedules and change keys.

D. The Key Cabinet Manufacturer shall set up a three-way cross index system, including master keys, listing the keys alphabetically, the hooks numerically and the key changes numerically on different colored

index cards. Index cards shall be typewritten and inserted in a durable binder. Attach the keys to the two sets of numbered tags supplied with the cabinet. (The permanent tag and the loan key tag). Instruct the owner in proper use of the system. Install cabinet as directed by the Project Manager.

2.13 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick plates, mop plates and armor plates of metal, Type J100 series.
2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick plates and/or mop plates are not required on following door sides:
   a. Armor plate side of doors;
   b. Exterior side of exterior doors;
   c. Closet side of closet doors;
   d. Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.

2.14 EXIT DEVICES

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.

C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.

D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.

E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.15 FLUSH BOLTS (LEVER EXTENSION)

A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.

C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.16 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.17 DOOR PULLS WITH PLATES

A. Conform to ANSI A156.6. Pull Type J401, 152 mm (6 inches) high by 19 mm (3/4 inches) diameter with plate Type J302, 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Provide pull with projection of 70 mm (2 3/4 inches) and a clearance of 51 mm (2 inches). Cut plates of door pull plate for cylinders, or turn pieces where required.

2.18 PUSH PLATES

A. Conform to ANSI A156.6. Metal, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide metal Type J302 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. Cut plates for cylinders, and turn pieces where required.

2.19 COMBINATION PUSH AND PULL PLATES

A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

2.20 COORDINATORS

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back

strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.21 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. For thresholds at elevators entrances see other sections of specifications.

C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.

D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) from fame face.

2.22 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.23 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:

3. Slide-up doors.
4. Swing-up doors.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated

frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.24 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 626 or 630.
2. Hinges --interior doors: 652 or 630.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Thresholds: Mill finish aluminum.
6. Cover plates for floor hinges and pivots: 630.
7. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces.

E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.25 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	**Base Metal**
652	Steel

626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VA Project Manager for approval.

B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors except security bedroom, bathroom and anteroom doors which shall have closer installed parallel arm on exterior side of doors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by Project Manager. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; show in presence of Project Manager that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the Project Manager for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

A. Installer to provide letter to VA Project Manager that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Project Manger and VA Locksmith.

3.5 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.
B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets.

HARDWARE SETS

Hardware Group No. A01

For use on mark/door #(s):
1W109C 1W126C 1W147A 1W147B 1W151 1W213
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 5	652	IVE
1	EA	PUSH BUTTON LOCK	L1000-1	626	KAB
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	ARMOR PLATE	8400 36" X 2" LDW CS	630	IVE
1	EA	DOOR EDGE GUARD	703B	630	ROC
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. A01-F

For use on mark/door #(s):
1W126A 1W126B 1W225 1W227
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH BUTTON LOCK	L1000-1	626	KAB
1	EA	SURFACE CLOSER	4040XP SCUSH MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	DOOR EDGE GUARD	703B	630	ROC
1	SET	SEALS	2525	BRN	NGP

Operational Description

Self-Closing. Templating allows Spring CUSH Arm to stop the door's swing between 85 and 110 degrees.

Hardware Group No. A02

For use on mark/door #(s):
1C09B 1C09C 1W109A 1W147D
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 5	652	IVE
1	EA	PUSH BUTTON LOCK	L1000-1	626	KAB
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. BO

For use on mark/door #(s):
1W221G
Provide each SGL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1		HARDWARE BY GATE MANUFACTURER		

Note: gate lock shall accept Best CorMax 7-pin core and keying.

Hardware Group No. C01

For use on mark/door #(s):
1W106A 1W153A 1W153B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8808FL-CLASSROOM	626	YAL
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. C02

For use on mark/door #(s):
1C09A 1C09B 1C09C 1W106B 1W109A 1W147D
1W36A 1W36C 1W36E
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8808FL-CLASSROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. C02-F

For use on mark/door #(s):
1W201
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8808FL-CLASSROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP

Hardware Group No. C04

For use on mark/door #(s):
1CW07B
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4040XP MC	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	630	IVE
1	SET	SEALS	2525	BRN	NGP

Hardware Group No. D02

For use on mark/door #(s):

1C05A 1W109B 1W147C 1W208 BW201

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Hardware Group No. D02-A

For use on mark/door #(s):

1W106

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Hardware Group No. D02-F

For use on mark/door #(s):
1W200D
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.
At Door 1W200D, access controlled from inside Room 1W200B.

Hardware Group No. D02-R

For use on mark/door #(s):
1C05B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	EA	ROLLER BUMPERS	RB472	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Hardware Group No. D03

For use on mark/door #(s):
1C06 1C07
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-LC-99-L-E996-06-FSE-1439	626	VON
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Control contact electrically controls the locking or unlocking of the outside trim. The outside trim cylinder retracts the latchbolt for mechanical override. . One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted. Electrically unlocked.

Hardware Group No. D03-D

For use on mark/door #(s):

1W221C

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	DRIP CAP	16A	CL	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Hardware Group No. D03-E

For use on mark/door #(s):

1CP06

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-LC-99-L-E996-06-FSE-1439	626	VON
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	DRIP CAP	16A	CL	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
1	SET	WIRING DIAGRAMS	AS REQUIRED		
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Operational Description

Free Egress at all times. Pressing Push Bar retracts latchbolts. Control contact electrically controls the locking or unlocking of the outside trim. The outside trim cylinder retracts the latchbolt for mechanical override. . One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted. Electrically unlocked.

Hardware Group No. D03-F

For use on mark/door #(s):
1CP01B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Hardware Group No. D03-G

For use on mark/door #(s):
1C11B 1W107A 1W107B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MORTISE LOCK	AUR8891FL-EAS-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.
Delete smoke seal at Door 1W107B

Hardware Group No. D04-A

For use on mark/door #(s):
1CP01A
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HW HINGE	5BB1HWSC 5	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-EL-9947-EO-F-LBR	626	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-EL-9947-NL-OP-F-LBR-110	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
2	EA	DOOR PULL, 1" ROUND	8103EZ 12" L	630	IVE
1	EA	AUTO OPERATOR - DOUBLE DOOR	MAGIC SWING	626	STA
2	EA	ACTUATOR	ACTUATOR	630	STA
1	SET	ASTRAGAL	115NA	CL	NGP
1	EA	PUSHBUTTON	621RD	629	SCE
1	EA	POWER SUPPLY	PS914 900-4RL	LGR	VON
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.
120 VAC required for auto operator.

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Trim always locked, entrance by optional trim when key retracts latchbolt from pull side. Control contact electrically retracts the latchbolt, either for momentary unlatching, or for extended periods of time. One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar.
Presenting authorized prox card to prox card reader will allow door to unlock and auto operator to open doors.
Pushbutton at reception desk will unlock doors and allow auto operator to open doors.

Hardware Group No. D04-B

For use on mark/door #(s):

1CW04A 1CW07A BCP01A

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-EL-9947-EO-F-LBR-GBK	626	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-EL-9947-NL-OP-F-LBR-110-GBK	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
2	EA	DOOR PULL, 1" ROUND	8103EZ 12" L	630	IVE
1	EA	AUTO OPERATOR - DOUBLE DOOR	MAGIC SWING	626	STA
2	EA	ACTUATOR	ACTUATOR	630	STA
1	EA	DRIP CAP	16A	CL	NGP
1	SET	ASTRAGAL	115NA	CL	NGP
2	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP
1	EA	POWER SUPPLY	PS914 900-4RL	LGR	VON
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

Electrical conduit installed in frame provided by frame supplier.
120 VAC required for auto operator.

Operational Description

Free Egress at all times. Pressing Push Bar retracts latchbolts. Trim always locked, entrance by optional trim when key retracts latchbolt from pull side. Control contact electrically retracts the latchbolt, either for momentary unlatching, or for extended periods of time. One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar.

Hardware Group No. D04-F

For use on mark/door #(s):
1CP05
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1HW 5X4.5	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-9947-EO-F-LBR	626	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-9947-L-F-LBR-E996-06-FS	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
2	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
2	EA	ARMOR PLATE	8400 36" X 1" LDW CS	630	IVE
2	EA	DOOR EDGE GUARD	703B	630	ROC
2	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP
1	EA	POWER SUPPLY	PS914 900-4RL-FA	LGR	VON
1			ACCESS CONTROL - WORK OF DIVISION 28		
1			CARD READER - WORK OF DIVISION 28		
1			DOOR CONTACT(S) - WORK OF DIVISION 28		
1			POWER SUPPLY - WORK OF DIVISION 28		
1			PROVIDE FACTORY POINT TO POINT WIRING DIAGRAMS		
1			PROVIDE RISER DIAGRAMS		

Electrical conduit welded in frame provided by hollow metal frame supplier.

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Control contact electrically controls the locking or unlocking of the outside trim. The outside trim cylinder retracts the latchbolt for mechanical override. . One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar. Electrically locked.
Free Egress at all times. Pressing Push Bar retracts latchbolts. No exterior trim. One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar.

Hardware Group No. E01

For use on mark/door #(s):
1W125 1W127 1W129 1W130 1W131 1W226
3W19D
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8807FL-OFFICE		YAL
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. E02

For use on mark/door #(s):
3W19B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8807FL-OFFICE		YAL
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. H02

For use on mark/door #(s):
1W230A
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8820FL-HOTEL	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. ICU

For use on mark/door #(s):
1W209 1W215 1W217 1W218 1W219
Provide each SL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
			HARDWARE BY DOOR MANUFACTURER		

Hardware Group No. K04-A

For use on mark/door #(s):
1CW04B
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HINGE	5BB1HW 5X4.5	652	IVE
2	EA	DOOR PULL, 1" ROUND	8103EZ 12" L	630	IVE
2	EA	PUSH BAR	9100-STD	630	IVE
1	EA	AUTO OPERATOR - DOUBLE DOOR	MAGIC SWING	626	STA
2	EA	ACTUATOR	ACTUATOR	630	STA
2	EA	WALL STOP	WS407CCV.	626	IVE
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

Provide door mounted safety sensor
INSTALL MOTION DETECTOR ABOVE DOOR ON BOTH SIDES OF THE OPENING.
Provide safety edges on doors as required.

Hardware Group No. K05

For use on mark/door #(s):
1W220
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HWSC 5	652	IVE
2	EA	DOOR PULL, 1" ROUND	8103EZ 12" L	630	IVE
2	EA	PUSH BAR	9100-STD	630	IVE
1	EA	AUTO OPERATOR - DOUBLE DOOR	MAGIC SWING	626	STA
	EA	ACTUATOR	MOTION ACTUATOR		STA
1	EA	ACTUATOR	MOTION DETECTOR		STA
2	EA	WALL STOP	WS407CCV.	626	IVE
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

INSTALL WALL-MOUNTED MOTION ACTIVATED ACTUATOR IN THE DECOM VESTIBULE;
INSTALL MOTION DETECTOR ABOVE OPENING IN THE AMBULANCE GARAGE.
Provide safety edges on doors as required.

Hardware Group No. OHD

For use on mark/door #(s):
1W221B 1W221D

Provide each RU door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1			HARDWARE BY DOOR MANUFACTURER		

Hardware Group No. P01

For use on mark/door #(s):
1W108 1W228 1W36B 1W36D 3W19C 3W19H
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P01-A

For use on mark/door #(s):
1W211 1W212 1W223
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P01-B

For use on mark/door #(s):
1W205A 1W205B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P01-C

For use on mark/door #(s):
1W200B
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P01-D

For use on mark/door #(s):
1W216
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	PIVOT SET	7253 SET	626	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	DOUBLE ACTING STRIKE	DLS-2	630	STA
1	EA	EMERGENCY RELEASE	ES-1	626	STA
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	172VA	CL	NGP

Provide anti-ligature knob on inside of room.
Requires frame to be cased opening.
Install seal on exterior of frame to limit vision around door perimeter.

Hardware Group No. P01-W

For use on mark/door #(s):
1W202 1W204 1W206
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P02

For use on mark/door #(s):
1W109D
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. P02-B

For use on mark/door #(s):
1W221E 1W221F
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER		

Hardware Group No. P04

For use on mark/door #(s):
3W19E
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	COORDINATOR	COR X FL	628	IVE

Hardware Group No. P04-M

For use on mark/door #(s):
1W235
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	MORTISE LOCK	AUR8801FL - PASSAGE	626	YAL
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	AL1024ULXPD8CBR	689	LCN
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

Operational Description
Magnetic Hold Open is continuously energized allowing the doors to be held open under normal building conditions. When the Fire Alarm is activated, power to the Magnetic Hold Open is disconnected causing the doors to close automatically.

Hardware Group No. S01-C

For use on mark/door #(s):
1W200C
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. S02

For use on mark/door #(s):
1W150 1W154 1W232 1W233 1W234 3W19G BW200
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. S02-D

For use on mark/door #(s):
1W145
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. S02-E

For use on mark/door #(s):
2W205 BW204
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	SET	SEALS	700EU	AL	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP

Hardware Group No. S02-F

For use on mark/door #(s):
1W214
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HWSC 5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP

Hardware Group No. S02-S

For use on mark/door #(s):
3W19F
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. S03-E

For use on mark/door #(s):
1W221A
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	DRIP CAP	16A	CL	NGP
1	SET	SEALS	700EU	AL	NGP
1	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	425	AL	NGP

Hardware Group No. S03-F

For use on mark/door #(s):
1W236
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP

Hardware Group No. S03-S

For use on mark/door #(s):
1W229
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA MC	689	LCN
1	EA	ARMOR PLATE	8400 36" X 2" LDW CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. S04-S

For use on mark/door #(s):
BW202A
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1HW 5X4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	L04261	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	MORTISE LOCK	AUR8805FL-STOREROOM	626	YAL
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4040XP MC	689	LCN
2	EA	ARMOR PLATE	8400 36" X 1" LDW CS	630	IVE
2	EA	DOOR EDGE GUARD	703B	630	ROC
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

Hardware Group No. SLD

For use on mark/door #(s):

1W111A	1W113A	1W114A	1W115A	1W116A	1W117A
1W118A	1W119A	1W120A	1W121A	1W122A	1W124A
1W133A	1W135A	1W136A	1W137A	1W138A	1W139A
1W140A	1W141A	1W142A	1W143A	1W144A	1W146A

Provide each SL door(s) with the following:

Qty	Description	Catalog Number	Finish	Mfr
1		HARDWARE BY DOOR MANUFACTURER		

Hardware Group No. T01

For use on mark/door #(s):

1W111B	1W113B	1W114B	1W115B	1W116B	1W117B
1W118B	1W119B	1W120B	1W121B	1W122B	1W124B
1W133B	1W135B	1W136B	1W137B	1W138B	1W139B
1W140B	1W141B	1W142B	1W143B	1W144B	1W146B
1W230B					

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	AUR8802 - PRIVACY	626	YAL
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTE: where a wall stop does not work, provide an overhead stop.

Hardware Group No. T01-A

For use on mark/door #(s):

1W112A	1W112B	1W134	1W148A	1W148B	1W210
1W222	1W231	1W38	1W38A		

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK X INDICATOR	AUR8864FL-PRIVACY W/IND	626	YAL
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. T02-F

For use on mark/door #(s):

1W200A

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK X INDICATOR	AUR8864FL-PRIVACY W/IND	626	YAL
1	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	2525	BRN	NGP

Hardware Group No. X02-B

For use on mark/door #(s):
1ST06
Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1HW 5X4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-996-06	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
1	EA	SURFACE CLOSER	4040XP MC	689	LCN
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	2525	BRN	NGP

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever.

Hardware Group No. X04

For use on mark/door #(s):
BW202B
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	9947-EO-LBR	626	VON
1	EA	PANIC HARDWARE	9947-L-LBR-996-06	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
2	EA	SURFACE CLOSER	4040XP EDA MC	US10B	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. No exterior trim. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted.
Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted.

Hardware Group No. X04-F

For use on mark/door #(s):
BCP01B
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1HW 5X4.5	652	IVE
2	EA	FIRE EXIT HARDWARE	9947-EO-F-LBR	US26D	VON
2	EA	FIRE EXIT HARDWARE	9947-L-F-LBR-996-06	626	VON
1	EA	BEST CYLINDER	BLDG STANDARD	626	
2	EA	SURFACE CLOSER	4040XP EDA MC	US10B	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B4E.	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever.
Free Egress at all times. Pressing Push Bar retracts latchbolts. No exterior trim.

Hardware Group No. X05-A

For use on mark/door #(s):
1W220A
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HWSC 5	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
2	EA	ELEC FIRE EXIT HARDWARE	LX-RX-LC-QEL+-9947-L-F-LBR-996-06	626	VON
1	EA	AUTO OPERATOR - DOUBLE DOOR	MAGIC SWING	626	STA
1	EA	ACTUATOR	MOTION ACTUATOR		STA
1	EA	ACTUATOR	MOTION DETECTOR		STA
2	EA	WALL STOP	WS407CCV.	626	IVE
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

INSTALL WALL-MOUNTED MOTION ACTIVATED ACTUATOR IN CORRIDOR. INSTALL MOTION DETECTOR ABOVE OPENING IN THE DECON VESTIBULE.
Provide safety edges on doors as required.

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. Latchbolt retracted by lever unless locked by key. Key locks and unlocks lever. Control contact electrically retracts the latchbolt either for momentary unlatching or forextended periods of time. Provides quiet operation. One internal SPDT switch monitors the latchbolt position. A second internal SPDT switch monitors the depression of the pushbar or crossbar.

Hardware Group No. X05-M

For use on mark/door #(s):
1C11A 1CW07
Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HWSC 5	652	IVE
2	EA	FIRE EXIT HARDWARE	9947-EO-F-LBR	626	VON
2	EA	SURFACE CLOSER	4040XP MC	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	630	IVE
2	EA	MAG HOLDER	ALBR1024ULXPD8C		ALT
1	SET	SEALS	2525	BRN	NGP
1	SET	ASTRAGAL	115NA	CL	NGP

Magnetic hold opens shall be tied into the fire alarm system and release the doors upon activation of the fire alarm system.

Operational Description
Free Egress at all times. Pressing Push Bar retracts latchbolts. No exterior trim.

Door/Hardware Index

No Area

Door #	HWSet #
1C05A	D02
1C05B	D02-R
1C06	D03
1C07	D03
1C09A	C02
1C09B	A02
1C09C	A02
1C11A	X05-M
1C11B	D03-G
1CP01A	D04-A
1CP01B	D03-F
1CP05	D04-F
1CP06	D03-E
1CW04A	D04-B
1CW04B	K04-A
1CW07	X05-M
1ST06	X02-B
1W106	D02-A
1W106A	C01
1W106B	C02
1W107A	D03-G
1W107B	D03-G
1W108	P01
1W109A	A02
1W109B	D02
1W109C	A01
1W109D	P02
1W111A	SLD

Door #	HWSet #
1W111B	T01
1W112A	T01-A
1W112B	T01-A
1W113A	SLD
1W113B	T01
1W114A	SLD
1W114B	T01
1W115A	SLD
1W115B	T01
1W116A	SLD
1W116B	T01
1W117A	SLD
1W117B	T01
1W118A	SLD
1W118B	T01
1W119A	SLD
1W119B	T01
1W120A	SLD
1W120B	T01
1W121A	SLD
1W121B	T01
1W122A	SLD
1W122B	T01
1W124A	SLD
1W124B	T01
1W125	E01
1W126A	A01-F
1W126B	A01-F
1W126C	A01

Door #	HWSet #
1W127	E01
1W129	E01
1W130	E01
1W131	E01
1W133A	SLD
1W133B	T01
1W134	T01-A
1W135A	SLD
1W135B	T01
1W136A	SLD
1W136B	T01
1W137A	SLD
1W137B	T01
1W138A	SLD
1W138B	T01
1W139A	SLD
1W139B	T01
1W140A	SLD
1W140B	T01
1W141A	SLD
1W141B	T01
1W142A	SLD
1W142B	T01
1W143A	SLD
1W143B	T01
1W144A	SLD
1W144B	T01
1W145	S02-D
1W146A	SLD
1W146B	T01
1W147A	A01
1W147B	A01
1W147C	D02
1W147D	A02
1W148A	T01-A
1W148B	T01-A
1W150	S02
1W151	A01
1W153A	C01
1W153B	C01
1W154	S02
1W200A	T02-F
1W200B	P01-C
1W200C	S01-C
1W200D	D02-F
1W201	C02-F
1W202	P01-W
1W204	P01-W
1W205A	P01-B
1W205B	P01-B

Door #	HWSet #
1W206	P01-W
1W208	D02
1W209	ICU
1W210	T01-A
1W211	P01-A
1W212	P01-A
1W213	A01
1W214	S02-F
1W215	ICU
1W216	P01-D
1W217	ICU
1W218	ICU
1W219	ICU
1W220	K05
1W220A	X05-A
1W221A	S03-E
1W221B	OHD
1W221C	D03-D
1W221D	OHD
1W221E	P02-B
1W221F	P02-B
1W221G	BO
1W222	T01-A
1W223	P01-A
1W225	A01-F
1W226	E01
1W227	A01-F
1W228	P01
1W229	S03-S
1W230A	H02
1W230B	T01
1W231	T01-A
1W232	S02
1W233	S02
1W234	S02
1W235	P04-M
1W236	S03-F
1W36A	C02
1W36B	P01
1W36C	C02
1W36D	P01
1W36E	C02
1W38	T01-A
1W38A	T01-A
2W205	S02-E
3W19B	E02
3W19C	P01
3W19D	E01
3W19E	P04
3W19F	S02-S

Door #	HWSet #
3W19G	S02
3W19H	P01
BCP01A	D04-B
BCP01B	X04-F
BW200	S02
BW201	D02
BW202A	S04-S
BW202B	X04
BW204	S02-E

Door #	HWSet #

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

A. Factory glazed by manufacturer in following units:
   1. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
   2. Section 08 51 13.11, SIDE HINGED ALUMINUM WINDOWS (Double Glazed).
   3. Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.

1.3 LABELS

A. Temporary labels:
   1. Provide temporary label on each light of glass and plastic material identifying manufacturer or brand and glass type, quality and nominal thickness.
   2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
   3. Temporary labels shall remain intact until glass is approved by Project Manager.

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 code.
2. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

C. Glass Color: Match existing tinted exterior glass.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Certificates:
1. Certificate on shading coefficient.
2. 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. Glazing cushion.
5. Sealing compound.
6. Plastic glazing material, each type required.

E. Samples:
1. Size: 6 inches by 6 inches.
2. Tinted 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.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
2. Temporary protections: The glass front and polycarbonate back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.
3. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.
4. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

A. Warranty: Conform to terms of "Warranty of Construction", 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.
   3. Polycarbonate to remain clear and ultraviolet light stabilized 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):

Z97.1-09.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

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

C542-05.....Lock-Strip Gaskets

C716-06.....Installing Lock-Strip Gaskets and Infill Glazing Materials.

C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-11.....Elastomeric Joint Sealants

C964-07.....Standard Guide for Lock-Strip Gasket Glazing

C1036-06.....Flat Glass

C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C1376-10.....Pyrolytic and Vacuum Deposition Coatings on Flat Glass

D635-10.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position

D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

E84-10.....Surface Burning Characteristics of Building Materials

E119-10.....Standard Test Methods for Fire Test of Building Construction and Material

E2190-10.....Insulating Glass Unit

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; 2010

F. National Fire Protection Association (NFPA):

80-13.....Fire Doors and Windows.

252-12.....Standard Method of Fire Test of Door Assemblies

257-12.....Standard on Fire Test for Window and Glass Block Assemblies

G. National Fenestration Rating Council (NFRC)

H. Safety Glazing Certification Council (SGCC) 2012:

Certified Products Directory (Issued Semi-Annually).

I. Underwriters Laboratories, Inc. (UL):

752-11.....Bullet-Resisting Equipment.

J. Unified Facilities Criteria (UFC):

4-010-01-2012.....DOD Minimum Antiterrorism Standards for Buildings

K. Glass Association of North America (GANA):

Glazing Manual (Latest Edition)

Sealant Manual (2009)

L. American Society of Civil Engineers (ASCE):

ASCE 7-10.....Wind Load Provisions

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, 1/4 inch.

C. Tinted Heat reflective and low emissivity coated glass:

1. ASTM C1036, Type I, Class 2, Quality q3.
2. Color: Dark Bronze.
3. Thickness, 1/4 inch.

2.2 HEAT-TREATED GLASS

A. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 1/4 inch.

B. Tinted Tempered Glass.
1. ASTM C1048, Kind FT, Condition A, Type I, Class 2, Quality q3.
2. Color: Dark Bronze.
3. Thickness, 1/4 inch.

2.3 COATED GLASS

A. Spandrel Glass:
1. ASTM C1048, Kind HS, Condition B, Type I.
2. Thickness, 1/4 inch.

B. 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, 3/16 inch.

C. Ceramic Coated Spandrel Glass:
1. ASTM C1048, Kind, Condition B, Type I, Class, Quality q3 with ceramic coating applied over and fused into glass surface.
2. Pattern as indicated in drawings.
3. Apply coating to second surface.
4. Thickness, 1/4 inch.

2.4 PLASTIC

A. Clear Polycarbonate Sheet, Abrasion Resistant:
1. Fed. Spec. A-A-59502, Type III, coated mar resistant, Class 1, ultraviolet light stabilized, Grade A, High abrasion resistance. Flame spread of 10 or less when tested per ASTM E84.

2.5 GLASS CLAD POLYCARBONATE SECURITY GLAZING ASSEMBLY

A. Use 0.050 inch polyurethane sheeting for interlayer between glass and polycarbonate.

B. Clear Heat Strengthened Glass Clad Polycarbonate.
1. Use ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, outer glass panes.
2. Use clear polycarbonate sheet, 1/8 inch thick core.
3. Thickness, 7/16 inch.

C. Clear Tempered Glass Clad Polycarbonate:
1. Use ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, 1/8 inch thick outer glass panes.

2. Use clear polycarbonate sheet, 1/8 inch thick core.
3. Thickness, 7/16 inch.

D. Maximum Allowable Area: Laminated glazing shall not exceed 1.32 meter
E. square unless glazing has been certified.

2.6 INSULATING GLASS UNITS

A. Manufacturers: Basis of Design: "SolarBronze + Solarban 60 (3) Clear" by PPG.
B. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.
C. Assemble units using glass types specified:
D. Sealed Edge Units (SEU):
1. Insulating Glass Unit Makeup
a. Outboard Lite
1) Glass type: Tinted, Fully Tempered Safety Glass.
2) Glass Tint: Dark Bronze.
3) Nominal Thickness: ¼".
4) Glass Strength: (Tempered)
5) Coating Orientation: (N/A)
b. Spacer
1) Nominal Thickness: ½".
2) Gas Fill: (Air or 90% Argon)
c. Inboard Lite
1) Glass Type: Clear, Fully Tempered Safety Glass.
2) Glass Tint: N/A.
3) Nominal Thickness: ¼".
4) Glass Strength: (Tempered)
5) Coating Orientation: (Surface #3)
2. Performance Characteristics (Center of Glass)
a. Visible Transmittance: 42%
b. Visible Reflectance: 7%
c. Winter U-factor (U-value): 0.29
d. Shading Coefficient (SC): 0.36
e. Solar heat Gain Coefficient (SHGC): 0.31
3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.

4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.

2.7 FIRE RESISTANT GLASS WITHOUT WIRE MESH

A. Type 1 (Transparent float glass), Class 1 (Clear).

B. Fire-protective glass products used to protect against smoke and flames only shall be rated for 45 minutes as required by local building code and shall be tested in accordance with NFPA 252 (Standard Methods of Fire Tests of Door Assemblies) and NFPA 257 (Standard on Fire Test for Window and Glass Block Assemblies).

C. Fire-resistive products used to protect against smoke, flame, and the transmission of radiant heat shall be rated for 90 minutes and shall be tested in accordance with NFPA 252, NFPA 257, and ASTM E119 (Standard Test Methods for Fire Tests of Building Construction and Materials).

D. Fire-rated glass or glass assembly shall be classified by Underwriters Laboratory (UL), Intertek Testing Services- Warnock Hersey (ITS-WHI) or any other OSHA certified testing laboratory. All glass shall bear a permanent mark of classification in accordance with local building code.

E. Maximum size is per the manufacturer’s test agency listing for doors, transoms, side lights, borrowed lights, and windows.

F. Where safety glazing is required by local building code, fire-rated glass shall be tested in accordance with CPSC 16 CFR 1201 Category I or II and bear a permanent mark of classification.

1. Category I products are limited to 9 ft2 and tested to no less than 150 ft-lbs impact loading.
2. Category II products are greater than 9 ft^2 and tested to no less than 400 ft-lbs impact loading. Category II products can be used in lieu of Category I products.

2.8 STAINED GLASS INSERTS

A. Provide four (4) 1/8” x 40” w. x 53” h. stained glass panels with ½” zinc edge frames. Coordinate delivery of stained glass panels to millwork shop for fabrication and insertion in hardwood frame. Stained glass shall include opalescent colored glass joined with foil and solder construction (front and back sides). Match the pattern and colors of glass shown in the drawings.

2.9 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: two inches except four to six inches for insulating glass.
   4. Block width: Approximately 1/16 inch less than the full width of the rabbet.
   5. Block thickness: Minimum 3/16 inch. Thickness sized for rabbet depth as required.

C. 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.

D. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

E. 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.

F. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

G. 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.

H. 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.

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. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

F. Plastic:

1. Use dry glazing method.
2. Use only neoprene or EPDM gaskets.

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 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 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, 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 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, 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 glazing type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of glazing 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 24 inch intervals, 1/4 inch below sight line.

C. Fill gaps between glazing and stops with glazing type sealant to depth of bite on glazing, but not more than 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 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 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 24 inch intervals, 1/4 inch below sight line.

E. Fill gaps between pane and applied stop with glazing type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.8 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Project Manager.

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.

3.9 PROTECTION

A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.10 GLAZING SCHEDULE

A. Fire Resistant Glass:

1. Use Fire Resistant Glass without wire mesh in the following:

a. Interior Vision Panels in Doors and Sidelights.

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 tinted tempered glass in exterior pane and clear tempered glass in interior pane unless specified otherwise of insulating glass units adjacent to door.
8. 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.

D. 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 tinted tempered and clear tempered glass in storefronts, curtain walls adjacent to entrances or walks.

E. Spandrel Glass: Install specified spandrel glazing where indicated.

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SECTION 08 81 30

INTERIOR SEALED GLASS BLIND SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulated glass blind system

B. Related Sections:

1. Section 08 80 00 Glazing for standard glass products.
2. Section 08 41 02 Interior Aluminum Framing System

1.2 DEFINITIONS

A. Glazing Manufacturers: Firms that produce primary glass, as defined in referenced glazing publications.

B. Interspace: Space between lites of insulating glass blind systems.

1.3 PERFORMANCE REQUIREMENTS

A. Provide insulating glass blind systems that comply with the following:

1. ASTM E 774 testing in insulating glass units for durability classification by Insulating Glass Certification Council.
2. Life cycle testing demonstrating over 10,000 tilting operations.
3. Demonstrate proper blind operation inside insulating glass unit with inside glass exposed to temperature of 20 deg C and external glass exposed to temperature of minus 30 deg

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include elevations, edge details, hardware, and attachments to other work.

C. Samples: For the following products, in the form of 15 x 18 - inch square Samples for glass.

D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Product who are certified under the National Glass Association’s Certified Glass Installer Program.

B. Source Limitations for Insulating Glass Blind Systems: Obtain insulating glass blind systems from single source from single manufacturer.

C. Glazing Publications: Comply with the following published

recommendations:

1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for commercial and Residential Use."

D. Safety Glazing Products: For Tempered insulating glass blind systems, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.8 COORDINATION

A. Coordinate dimensions, including thickness, of insulating glass blind systems with dimensions of construction that receives insulating glass blind systems.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to

glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moistures, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Blinds: Manufacturer's standard form in which insulating glass blind systems manufacturer agrees to repair or replace blinds that fail or deteriorate within specified warranty period. Failure does not include blinds that have been exposed to temperatures greater than 220 deg F or external magnetic operator.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 INSULATING GLASS BLIND SYSTEMS

A. Insulating Glass Blind Systems: Magnetically-coupled gear-driven tilt mini-blind installed in sealed insulating glass, with externally-mounted magnet assembly that is coupled to an internal magnet that controls the tilting of blind slats. Force to tilt blind is less than 10 Newtons.

1. Air Space: ¾ inch.
2. Tilt Operator Type; Magnet knob operator.
3. Tilt Operator Location: manufacturer's standard.

B. Horizontal Louver Blinds, Aluminum Slats:

1. Slats: 6010-T8 aluminum alloy, 0.50-inch wide by 0.008-inch thick, with crowned profile.
2. Spacing: Manufacturer's standard.
3. Finish: One color, baked polyester paint ultra-violet-resistant finish.
4. Head and Bottom Rails: 6063-T5 aluminum alloy, painted in coordinated color with slats. Side rails support head rail and provide spacing between blind and inside surface of glass.
5. Ladder Tapes and Plisse Cords: Thermally-fixed polyester, UV resistant, and evenly spaced to prevent long-term slat sag.
6. Operating Mechanism: Sintered neodymium, iron-boron magnets, producing energy of Bh maximum 33 to 35 Mega Oersteds and maximum working temperature of 248 deg F. Internal mechanism has steel gears hardened on surface and bearings to reduce friction and

support magnets.

7. Colors, Textures, Patterns, and Gloss: As selected by the Architect from Manufacturer's standard color options.

C. Insulating Glass Units: Clear insulating glass, factory assembled units consisting of sealed lites separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Heat-Treated Float Glass: ASTM C 1048; Type 1; Quality-Q3; Class 1 (clear) unless otherwise indicated; of kind and condition indicated.
   a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   b. Glass to be fully tempered float glass on both sides of the unit.
2. Glass Thickness: 3/16 inch, minimum. Provide glazing in thicknesses as needed to comply with requirements indicated.
3. Overall Thickness of Insulated Glass Blind System Unit: 1 inch minimum.
4. Sealing System: Seal with manufacturer's standard sealant.
5. Spacer: Manufacturer's standard spacer material and construction.
6. Desiccant: Molecular sieve or silica gel, or blend of both.

D. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide:

Kyler Industries
192 East 48th Street
Holland, MI 49423
(616) 392-1042 (voice) (616) 392-3778 (fax)
www.Kyler-Industries.com

E. Miscellaneous Glazing Materials: Refer to Division 8 Section "Glazing".

F. Lite Kit: This section shall provide the lite kit compatible with the sealed units. Kit shall be as manufactured by Nation Guard and provided in factory applied powder coat. Color as selected by the Architect from manufacturer's standard colors.

2.2 FABRICATION

A. Factory fabricate insulating glass blind system with necessary

space around internal magnet so it interfaces with external magnet operator.

B. Tolerances:

1. Space of approximately 1/8 inch on each side between slats and spacer, for free movement of system and allowing thermal transmission of aluminum slats.
2. Blind Width Tolerance: Plus zero; minus 1/16 inch.
3. Blind Height Tolerance: Plus 3/8 inch; minus zero. Bottom rail engages pins in sidetrack with some slack and is slightly above lower spacer bar.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine framing for insulating glass blind system units, with Installer present, for compliance with requirements for installation tolerances, minimum required face or edge clearances, effective sealing between joints of framing members, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving insulating glass blind system units immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 INSTALLATION

A. Install insulating glass blind system according to manufacturer's written instructions.

B. Refer to Division 8 Section "Glazing" for installation of insulating glass blind system units

3.4 ADJUSTING, CLEANING, AND PROTECTIONS

A. Remove protective film, clean glass, and position external magnet on glass aligned with internal magnet to produce optimum tilt operation for smooth slat rotation of blinds (per manufacturer's instructions).

1. Remove nonpermanent labels, and clean surfaces.

B. Protect insulating glass blind system units from damage immediately after installation by attaching crossed streamers to framing held away from glazing unit. Do not apply markers to security glazing

surfaces.

C. Protect insulating glass blind system units from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with insulating glass blind system units, remove substances immediately as recommended in writing by insulating glass blind system manufacturer.

D. Remove and replace insulating glass blind system units that are broken, chipped, cracked, or abraded or that are damaged from natural causes, accidents, or vandalism during construction period.

E. Wash insulating glass blind system units on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash insulating glass blind system units as recommended in writing by insulating glass blind system manufacturer.

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SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies fixed impact-resistant wall louvers.

1.2 RELATED WORK

A. Louvers in masonry walls: Section 04 20 00, UNIT MASONRY.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:
Each type, showing material, finish, size of members, method of assembly, and installation and anchorage details.

C. Manufacturer's Literature and Data:
Each type of louver.

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. The Master Painters Institute (MPI):
Approved Product List - September 2011

C. American Society for Testing and Materials (ASTM):
A167-99(R2009).....Stainless and Heat-Resisting Chromium - Nickel Steel Plate, Sheet, and Strip
A1008/A1008M-10.....Steel, Sheet, Carbon, Cold Rolled, Structural, and High Strength Low-Alloy with Improved Formability
B209/B209M-03(R2007)....Aluminum and Aluminum Alloy, Sheet and Plate
B221-08.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B221M-07.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Shapes, and Tubes

D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

E. National Fire Protection Association (NFPA):
90A-09.....Installation of Air Conditioning and Ventilating Systems

F. American Architectural Manufacturers Association (AAMA):

2605-11.....High Performance Organic Coatings on Architectural Extrusions and Panels

G. Air Movement and Control Association, Inc. (AMCA):

500-L-07.....Testing Louvers

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M.

B. Carbon Steel: ASTM A1008/A1008M.

C. Aluminum, Plate and Sheet: ASTM B209/B209M.

D. Fasteners: Fasteners for securing louvers and wall vents to adjoining construction, except as otherwise specified or shown, shall be toggle or expansion bolts, of size and type as required for each specific type of installation and service condition.

1. Where type, size, or spacing of fasteners is not shown or specified, submit shop drawings showing proposed fasteners, and method of installation.
2. Fasteners for louvers, louver frames, and wire guards shall be of stainless steel or aluminum.

E. Inorganic Zinc Primer: MPI No. 19.

2.2 EXTERIOR WALL LOUVERS

A. General:

1. Provide fixed type impact-resistant louvers of size and design shown. Basis of Design is Greenheck Fan Corporation model EHH-501X.
2. Heads, sills and jamb sections shall have formed caulking slots or be designed to retain caulking. Head sections shall have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill pan extension or separate sill.
4. Frame shall be mechanically fastened or welded construction with welds dressed smooth and flush.

B. Performance Characteristics:

1. Weather louvers shall have a minimum of 50 percent free area and shall pass 595 fpm free area velocity at a pressure drop not exceeding 0.05 inch water gage and carry not more than 0.01 ounces of water per square foot of free area for 15 minutes when tested per AMCA Standard 500-L.
2. Louvers shall bear AMCA certified rating seals for air performance and water penetration ratings.

C. Aluminum Louvers:

1. General: Frames, blades, sills 0.081-inch thick extruded aluminum. Blades shall be standard type and have reinforcing bosses.
2. Louvers, fixed: Make frame sizes 1/2-inch smaller than openings. Single louvers frames shall not exceed 66 inches wide. When openings exceed 66 inches, provide twin louvers separated by mullion members.

2.3 CLOSURE ANGLES AND CLOSURE PLATES

A. Fabricate from 0.081-inch thick aluminum.
B. Provide continuous closure angles and closure plates on inside head, jambs and sill of exterior wall louvers.
C. Secure angles and plates to louver frames with screws, and to masonry or concrete with fasteners as specified.

2.4 WIRE GUARDS

A. Provide wire guards on outside of all exterior louvers, except on exhaust air louvers.
B. Fabricate frames from 0.081-inch thick extruded aluminum designed to retain wire mesh.
C. Wire mesh shall be woven from not less than 0.063-inch diameter aluminum wire in 1/2-inch square mesh.
D. Miter corners and join by concealed corner clips or locks extending about 2-1/4 inches into rails and stiles. Equip wire guards over four feet in height with a mid-rail constructed as specified for frame components.
E. Fasten frames to outside of louvers with aluminum or stainless steel devices designed to allow removal and replacement without damage to the louvers.

2.5 FINISH

A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505
B. Aluminum Louvers:
   1. Anodized finish
      a. Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick.
   2. Organic Finish: AAMA 2605 (Fluorocarbon coating).
C. Sheet Steel: Baked-on or oven dried shop prime coat.
   1. Paint interior surfaces of lightproof louvers with two additional finish shop coats of baked-on flat black enamel.
   2. Finish painting of exposed surfaces of shop primed louvers is specified in Section 09 91 00, PAINTING.
D. Steel: Surfaces of steel work, for which no other finish is specified, shall be cleaned free from scale, rust, oil and grease, and then given a

light colored prime paint after fabrication, except ferrous metals concealed in finished work. Paint all contact surfaces of assembled work (except welded contact surfaces) with an additional shop coat of similar paint.

2.6 PROTECTION

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating the contact surfaces with a performed synthetic rubber tape having pressure sensitive adhesive coating on one side.

B. Isolate the aluminum from masonry by coating aluminum with zinc-chromate primer.

C. Protect finished surfaces from damage during fabrication, erection, and after completion of the work. Strippable plastic coating on colored anodized finish is not approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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.

B. 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.

C. Provide anchoring devices and fasteners as shown and as necessary for securing louvers to building construction as specified. Power actuated drive pins may be used, except for removal items and where members would be deformed or substrate damaged by their use.

D. Generally, set wall louvers in masonry walls during progress of the work. If wall louvers are not delivered to job in time for installation in prepared openings, make provision for later installation.

3.2 CLEANING AND ADJUSTING

A. After installation, all exposed prefinished and plated items and all items fabricated from stainless steel and aluminum shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

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Division 9

Finishes

Division 9

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SECTION 09 06 00
SCHEDULE FOR FINISHES

SECTION 09 06 00-SCHEDULE FOR FINISHES

VAMC: Iowa City Veterans Administration Health Care System

Location: Iowa City, Iowa

Project no. and Name: Expand Bldg 1 for PACT

Submission 100%

Date: 11-01-2014

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SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I – GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer’s trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer’s equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 APPLICABLE PUBLICATIONS

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

B. MASTER PAINTING INSTITUTE: (MPI)

2001.....Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1 DIGITAL COLOR PHOTOS

A. Size 24 x 35 mm.

B. Labeled for:

1. Building name and Number.
2. Room Name and Number.

2.2 DIVISION 05 – METALS

F. SECTION 05 51 00, METAL STAIRS

Component	Finish	Color
Newel Posts		P-1
Guard Rails		P-1
Handrails		P-1

2.3 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

B. SECTION 06 20 00, FINISH CARPENTRY

12. VANITIES (TYPES S4, S4 M)		
Room No. and Name	Component	Finish/Color

1W38, 1W38A, 1W200A, 1W232, 1W148, 1W148A, 2W05, 2W210, 3W200, 3W202, 1W231, 1W222, 1W210, 1W112, 1W112A, 1W134, 2W206	Countertop	Corian Burled Beach

2.4 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Door	Sherwin Williams-SW7048 Insl-x Urbane Bronze
Frame	Sherwin Williams-SW7048 Insl-x Urbane Bronze

B. SECTION 08 14 00, WOOD DOORS

Component	Finish/Color
Doors	Rotary Cut Light Birch, clear coat
Frames	Sherwin Williams-SW7048 Insl-x Urbane Bronze

C. SECTION 08 31 13, ACCESS DOORS AND FRAMES

Material	Finish/Color
Steel	P-1
Stainless Steel	Stainless Steel

D. SECTION 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Material	Finish	Manufacturer	Manufacturer Color Name/No.
Aluminum			
Glass			Dark Bronze

E. SECTION 08 51 13.11, SIDE-HINGED ALUMINUM WINDOWS

Finish	Ext. Glazing	Blind color	Int. Glazing	Manufacturer	Mfg. Color Name/No.

F. WINDOW SILLS

Room No. and Name	Material	Finish
	Aluminum (With Windows)	
	SECTION 04 72 00,CAST STONE MASONRY	

G. WINDOW STOOLS

Room No. and Name	Material	Finish
	Corian	Burled Beach

H. SECTION 08 44 13, GLAZED ALUMINUM CURTAIN WALLS

Component	Material	Finish	Manufacturer	Mfg. Color Name/No.
Frame				Dark Bronze

Glazing				Dark Bronze

2.5 DIVISION 09 - FINISHES

A. SECTION 09 30 13, CERAMIC TILING

2. SECTION 09 30 13, CERAMIC TILING

Finish code	Manufacturer	Mfg. Color Name/No
CT-1	Caesar	Uniqua
CT-2	Caesar	Uniqua

B. SECTION 09 66 16, TERRAZZO TILE (TT)

Size	Manufacturer	Color Pattern/Name/No.
12x12	Fritz Tile	Classic Terrazzo-Amarretto

C. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
ACT-1	Exposed Suspension System	White/tegular	Armstrong	Cirrus #584
ACT-2	Type III	White	Armstrong	Clean Room VL #868

D. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
L-1	13x13	Linoleum	Forbo	Dual Tile-Rosato
L-3	13x13	Linoleum	Forbo	Dual Tile-Dove Grey

E. SECTION 09 65 16, VINYL SHEET FLOORING, HEAT WELDED SEAMS (WSF)

Finish Code	Pattern name	Manufacturer	Mfg. Color Name/No.
L-2	Marmoleum Real	Forbo	Eiger
L-4	Marmoleum Real	Forbo	Dove Grey
SVF-1	Forestscapes	Teknoflor	Fruitwood
SVF-2	Forestscapes	Teknoflor	Black Walnut

1. SECTION 09 65 16, WELDING RODS (WSF)

Finish code	Manufacturer	Mfg. Color Name/No.
WSF-1	Forbo	To match Real Dove Grey
WSF-2	Teknoflor	To match Forestscapes Fruitwood
WSF-3	Teknoflor	To match Forestscapes Black Walnut

F. SECTION 09 65 13, RESILIENT BASE STAIR TREADS AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
RB	Rubber Base (RB)		Roppe	Black Brown

RST	Resilient Stair Treads (RST)		Roppe	Style: 95 Color: Black Brown

H. SECTION 09 68 00, CARPET MODULES (CFT)

Finish Code	Size	Pattern direction	Manufacturer	Mfg. Color Name/No.
CPT-1	12X12	Quarter Turn	Lees	Beautiful Abandon-Character Lines-Artifact
CPT-2	12X12	Quarter Turn	Lees	Beautiful Abandon-Character Lines-Industrial Patina

P. SECTION 09 67 23, EPOXY RESINOUS FLOORING (ERF)

Finish code	Manufacturer	Mfg. Color Name/No.
ERF	Dur-a-flex	Polycrete Q28-17

J. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

		Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and	max 10 units
Gloss Level 2	a high side sheen flat-"a velvet-like" finish	max 10 units, and	10-35 units
Gloss Level 3	a traditional "egg-shell like" finish	10-25 units, and	10-35 units
Gloss Level 4	a "satin-like" finish	20-35 units, and	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	
Gloss Level 6	a traditional gloss	70-85 units	

Gloss level 7 a high gloss more than 85 units

2. Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1	Level 5	Sherwin Williams	SW6126 Navajo White
P-2	Level 5	Sherwin Williams	SW7048 Urbane Bronze
P-3	Level 5	Sherwin Williams	SW6142 Macadamia
P-4	Level 5	Sherwin Williams	SW6026 Oyster Bay
P-5	Level 5	Sherwin Williams	SW7738 Cargo Pants
P-6	Level 5	Sherwin Williams	SW7739 Herbal Wash
P-7	Level 5	Sherwin Williams	

Finish Code	Manufacturer	Mfg. Color Name/No.
VWC	Koroseal	Traces-Pesto

2.6 DIVISION 10 - SPECIALTIES

B. SECTION 10 21 23, HOSPITAL CUBILCE CURTAINS

Finish Code	Manufacturer	Mfg. Color Name/No.
CC	ARC COM	Woodland Way Jewel #5

C. SECTION 10 26 00, WALL GUARDS AND CORNER GUARDS

Item	Material	Manufacturer	Mfg. Color Name/No.
Corner Guards		Inpro Corporation	Monterey 0110
Wall Guard/Handrails		Inpro Corporation	800 series color-0256 Castle
Wall Guard		Korogard	Lava

D. SECTION 10 28 00 / 10 14 00 / 11 17 36, MISCELLANEOUS SPECIALITIES

Room No. and Name	Item	Finish	Manufacturer	Mfg. Color Name/No.
	Mop racks	Stainless Steel		

G. SECTION 10 22 26.13, FOLDING PANEL PARTITION (FP)

Room No. and Name	Component	Material	Manufacturer	Mfg. Color Name/No.
Chapel 3W19D	Panel Face			
	Panel Edge			

2.7 DIVISION 12 - FURNISHINGS

A. SECTION 12 32 00, WOOD CASEWORK

Room Number	Location	Finish/Color
All vertical casework is to be PL-1	Vertical Surface	Plastic Laminate-Wilsonart-Monticello Maple
All solid surface is to be SS-1	Countertop	Corian-Burled Beach

B. SECTION 12 24 00, WINDOW SHADES

Component	Material	Manufacturer	Mfg. Color Name/No.
Shade Cloth			
Venetian Blinds			

Support Hardware			

PART III EXECUTION

2.8 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Access Flooring	AF
Accordion Folding Partition	AFP
Acoustical Ceiling	AT
Acoustical Ceiling, Special Faced	AT (SP)
Acoustical Metal Pan Ceiling	AMP
Acoustical Wall Panel	AWP
Acoustical Wall Treatment	AWT
Acoustical Wallcovering	AWF
Anodized Aluminum Colored	AAC
Anodized Aluminum Natural Finish	AA
Baked On Enamel	BE
Brick Face	BR
Brick Flooring	BF
Brick Paving	BP
Carpet	CP
Carpet Athletic Flooring	CAF
Carpet Module Tile	CPT
Ceramic Glazed Facing	CGFB
Brick	
Ceramic Mosaic Tile	FTCT
Concrete	C
Concrete Masonry Unit	CMU
Cubicle Curtain	CC
Divider Strips Marble	DS MB
Epoxy Coating	EC
Epoxy Resin Flooring	ERF
Existing	E
Exposed Divider Strips	EXP
Exterior	EXT
Exterior Finish System	EFS
Exterior Paint	EXT-P
Exterior Stain	EXT-ST
Fabric Wallcovering	WF
Facing Tile	SCT
Feature Strips	FS
Floor Mats & Frames	FM
Floor Tile, Mosaic	FT
Fluorocarbon	FC
Folding Panel Partition	FP
Foot Grille	FG
Glass Masonry Unit	GUMU
Glazed Face CMU	GCMU
Glazed Structural Facing Tile	SFTU
Granite	GT
Gypsum Wallboard	GWB
High Glazed Coating	SC

Latex Mastic Flooring	LM
Linear Metal Ceiling	LMC
Linear Wood Ceiling	LWC
Linoleum	L
Marble	MB
Material	MAT
Mortar	M
Multi-Color Coating	MC
Natural Finish	NF
Paint	P
Paver Tile	PVT
Perforated Metal Facing (Tile or Panels)	PMF
Plaster	PL
Plaster High Strength	HSPL
Plaster Keene Cement	KC
Plastic Laminate	HPDL
Polypropylene Fabric Wallcovering	PFW
Porcelain Paver Tile	PPT
Porcelain Tile	PT
Quarry Tile	QT
Radiant Ceiling Panel System	RCP
Resilient Stair Tread	RST
Rubber Base	RB
Rubber Tile Flooring	RT
Solid Surface	SS

Spandrel Glass	SLG
Stain	ST
Stone Flooring	SF
Structural Clay	SC
Suspension Decorative Grids Grids	SDG
Terrazzo Portland Cement	PCT
Terrazzo Tile	TT
Terrazzo, Thin Set	
Textured Gypsum Ceiling Panel	TGC
Textured Metal Ceiling Panel	TMC
Thin set Terrazzo	TST
Veneer Plaster	VP
Vinyl Base	VB
Vinyl Coated Fabric Wallcovering	W
Vinyl Composition Tile	VCT
Vinyl Sheet Flooring	VSF
Vinyl Sheet Flooring (Welded Seams)	WSF
Wall Border	WB
Wall Protection	WP
Wood	WD

2.9 FINSIH SCHEDULE SYMBOLS

Symbol Definition
** Same finish as adjoining walls
- No color required
E Existing
XX To match existing
EFTR Existing finish to remain

RM Remove

2.10 ROOM FINISH SCHEDULE

A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

B. ROOM FINISH SCHEDULE

Room No. and Name	FLOOR			BASE		WALL		WAINSCOT		CEILING		REMARKS
PATIENT FAMILY WAITING 1W36	MAT C	FC CP1		MAT	FCC	MAT	FCC	MAT	FC	MAT	FC C	
			N		RB		P-1			AT-1		
			E		RB		P-1					
			S		RB		P-1					
			W		RB		P-1					
			C		RB		P-1					
PUBLIC/ STAFF/ PATIENT TOILETS	C	PT1	N		PT-1		PT-2			AT-1		
			E		PT-1		PT-2					
			S		PT-1		PT-2					
			W		PT-1		PT-2					

1W38 1W38A 1W200A 1W230B 1W148 1W148A 1W231 1W222 1W210 1W112 1W112A 1W134			C		PT-1		PT-2				
ELIGIBILITY & ENROLLMENT 1W36A 1W36B	C	CP1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
ELIGIBILITY & ENROLLMENT WK STATIONS 1W36C 1W36E	C	CP1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				

PHOTO ALCOVE 1W36D	C	CP1	N E S W C		RB RB RB RB RB		P-1 P-1 P-1 P-1 P-1			AT-1	
BREAK ALCOVE 1W36K	C	L1	N E S W C		RB RB RB RB RB		P-1 P-1 P-1 P-1 P-1			AT-1	
WHEELCHAIR ALCOVE 1W38B	C	TT	N E S W C		CB CB CB CB CB		VWC VWC VWC VWC VWC			AT-1	
RECEPTION 1W106	C	L1	E		RB		P-1			AT-1	
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
			C		RB		P-1				
ENTRY VESTIBULE 1CW04	C	TT	N		CB		VWC			AT-1	Grind new tile edge to create ramp to match thickness of existing tile.
			E		CB		VWC				
			S		CB		VWC				

			W		CB		VWC				
			C		CB		VWC				
STAFF WK ROOM 1W106A	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
CALL CENTER 1W106B	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
WAITING 1W107	C	CP1	N		RB		P-1			AT-1	
			E		RB		P-6				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
VENDING ALCOVE 1W107A	C	L2	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				

			W		RB		P-1				
			C		RB		P-1				
MY HEALTH VET 1W107B	C		N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
GROUP ROOM 1W108	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
PROVIDER WK ROOM 1W109 1W147	C	L3	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				

CLEAN MEDS 1W109A 1W126A 1W147B	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
SOILED HOLDING 1W109B 1W126B 1W147A 1W225	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
SCALE ALCOVE 1W110 1W132 1W152	C	L2	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				

			C		RB		P-1				
EXAMS 1W111 1W113 1W114 1W115 1W116 1W117 1W118 1W119 1W120 1W121 1W122 1W124 1W133 1W135 1W136 1W137 1W138 1W139 1W140 1W141 1W142 1W143 1W144 1W146	C	L4	N		RB		P-1			AT-1	
			E		RB		P-4				
			S		RB		P-1				
			W		RB		P-1				

			C		RB		P-1				
EXAMS 1W215 1W216 1W217 1W218 1W219 1W202	C	L4	N		RB		P-1			1W216- ABUSE RESIST. GWB. ALL OTHERS: AT-1	
			E		RB		P-1				
			S		RB		P-4				
			W		RB		P-1				
			C		RB		P-1				
EXAMS 1W204 1W206 1W211 1W212	C	L4	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-4				
			W		RB		P-1				
			C		RB		P-1				
RESIDENT WK ROOM 1W126	C	CP1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				

			W		RB		P-1				
			C		RB		P-1				
CHARTING ALCOVE 1W128	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
CLINIC COORDINATOR 1W125	C	SVF1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-5				
			W		RB		P-1				
			C		RB		P-1				
CONSULT ROOM 1W127 1W129 1W130 1W131	C	SVF1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-5				
			W		RB		P-1				
			C		RB		P-1				

CRASH CART 1W139B	C	L2	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
EQUIPMENT STORAGE 1W145 1W214	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
STAFF LOUNGE 1W151	C	L3	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-6				
			C		RB		P-1				
STAFF LOUNGE 1W228	C	L3	N		RB		P-6			AT-1	

			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
MULTI DISCIPLINARY TEAM WK ROOM 1W153A 1W153B	C	L3	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
HSKP 1W154 1W229	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
PATIENT/FAMILY WAITING 1W200	C	CP1	N		RB		P-1			AT-1	
			E		RB		P-3				
			S		RB		P-1				
			W		RB		P-1				

			C		RB		P-1				
TRIAGE 1W200B	C	L3	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
RECEPTION 1W201	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
NURSE STATION 1W203 1W207	C	L4	N		RB		P-1			AT-1	SOFFIT ABOVE IS TO BE PAINTED P-4 L2 BORDER SHOULD BE WIDTH OF BORDER ON OPPOSITE SIDE OF THE CORRIDOR
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-4				
PROVIDER WORKROOM 1W205	C	L3	N		RB		P-1			AT-1	

			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-3				
MEDS 1W208	C	L4	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
TRAUMA ROOM 1W209	C	L4	N		RB		P-1			AT-2	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
LINEN 1W213	C	L4	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
DECON 1W220	C	C	N		RB		P-1			AT-1	

			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
DECONTAM/TOILET 1W221A 1W221B	C	ERF	N		CB		P-1			WATER RESIST. GWB.	
			E		CB		P-1				
			S		CB		P-1				
			W		CB		P-1				
			C		CB		P-1				
EQUIP STORAGE 1W221C	C	C	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
OBSERVATION ROOM 2 1W223	C	L4	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-4				
			W		RB		P-1				

			C		RB		P-1				
NOURISH ALCOVE 1W224	C	L2	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
OFFICE DIRECTOR 1W226	C	SVF1	N		RB		P-5			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
CLEAN SUPPLY 1W227	C	L1	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
ON CALL 1W230A	C	L3	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				

			W		RB		P-1				
			C		RB		P-1				
ELEC 1W233	C	C	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
COMM 1W234	C	C	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
ELEV LOBBY 1W235	C	L123	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				

CORRIDOR 1CP01 1CP02 1CP03 1CP04 1CP05	C	L1,2	N		RB		P-1			AT-1	WP 4’-0” high-Inpro-Lava L-1 should be 13x13 tiles L-2 should be used for the border equal dimensions on both sides.
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
CORRICOR 1CP06 1C10 1C11 1C09 1C08 1C06 1C05 1C07	C	L1,2	N		RB		P-1			AT-1	L-1 should be 13x13 tiles L-2 should be used for the border equal dimensions on both sides.
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
CORRIDOR 1CW07	C	TT	N		CB		P-1			AT-1	L-1 should be 13x13 tiles L-2 should be used for the border equal dimensions on both sides.

			E		CB		P-1				
			S		CB		P-5				
			W		CB		P-1				
			C		CB		P-1				
STAIRS	C	RST	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				
STAIRS	C	RST	N		RB		P-1			AT-1	
			E		RB		P-1				
			S		RB		P-1				
			W		RB		P-1				
			C		RB		P-1				

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, or other building boards.

1.2 RELATED WORK

A. Load bearing framing: Section 05 40 00, COLD-FORMED METAL FRAMING.

B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

C. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS, Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists.

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)

A123-09.....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A653/A653M-09.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems

C635-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636-06.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-09.....Non-Structural Steel Framing Members

C754-09.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....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

E580-09.....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 as shown.
   1. Use ASTM A525 steel, 0.0359-inch thick bare metal.
   2. Runners same thickness as studs.
B. Provide not less than two cutouts in web of each stud, approximately 12 inches from each end, and intermediate cutouts on approximately 24-inch centers.
C. Doubled studs for openings and studs for supporting concrete backer-board.
D. Studs 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. "Z" Furring Channels:
   1. Not less than 0.0239-inch-thick bare metal, with 1-1/4 inch and 3/4-inch flanges.
   2. Web furring depth to suit thickness of insulation with slotted perforations.
C. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 SHEET METAL BACKING, FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. Provide continuous 18 gauge sheet metal backing on new walls for the Psych Exam 2 (1W216) from floor to 7’-2” above finished floor to provide reinforcement wall impact resistance.
B. Provide 18 gauge sheet metal backing where required on new walls for anchoring wall mounted equipment and accessories such as toilet accessories, wall hung casework and other equipment items.
C. ASTM C754, except as otherwise specified.

D. For fire rated construction: Type and size same as used in fire rating test.

E. Fasteners for steel studs thicker than 0.033-inch thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

F. 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.

G. 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.

H. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

I. 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 0.0396-inch thick galvanized steel with corrugated edges.

J. 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 1-3/8 inch wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 1-3/8 inch wide flange.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 24 inches on center.

C. Cut studs 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 3/8-inch long Type S pan head screws at not less than two feet on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 2 by 3 inches screwed to each stud with two screws in each stud. Locate splice plates at 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 2-1/2 inches wide.

J. Form building seismic or expansion joints with double studs back to back spaced three inches apart plus the width of the seismic or expansion joint.

K. Form control joint, with double studs spaced 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 2-1/2 inch or narrower studs, 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 24 inches on center, horizontally or vertically.
   2. Install "Z" furring channels vertically spaced not more than 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 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 4 inches of corner.
D. Installing Wall Furring-Bracket System: Space furring channels not more than 16 inches on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing, heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING SHAFT WALL SYSTEM

A. Conform to UL Design No. U438 for two-hour fire rating.
B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 24 inches on center.

C. After liner panels have been erected, cut C-H studs and E studs, from 3/8-inch to not more than 1/2-inch less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.

D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.

E. Suitably frame all openings to maintain structural support for wall:

1. Provide necessary liner fillers and shims to conform to label frame requirements.
2. Frame openings cut within a liner panel with E studs around perimeter.
3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for soffits.

1. Space framing at 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 48-inch maximum intervals along channels. Stagger hangers at alternate channels.

C. Where bar joists or beams are more than 48 inches apart, provide intermediate hangers so that spacing between supports does not exceed 48 inches. Use clips, bolts, or wire ties for direct attachment to steel framing.

D. Steel decking without concrete topping:

1. Do not fasten to steel decking 0.0299-inch or thinner.
2. Toggle bolt to decking 0.0359-inch or thicker only where anchorage to steel framing is not possible.

E. 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 48 inches on center.
   b. Install four foot tees not over 24 inches on center; locate for edge support of gypsum board.

c. Install wall track channel at perimeter.

F. Installing Ceiling Bracing System:

1. Construct bracing of 1-1/2 inch channels for lengths up to 8 feet and 2 inch channels for lengths over 8 feet with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 2 feet at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580.

3.7 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 1/8-inch from the layout line.

B. Plumb and align vertical members within 1/8-inch.

C. Level or align ceilings within 1/8-inch.

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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. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 05 40 00, COLD-FORMED METAL FRAMING, and Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical shaft wall assembly.
3. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

D. Test Results:

1. Fire rating test, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

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

B. American Society for Testing And Materials (ASTM):

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08.....Application and Finishing of Gypsum Board

C919-08.....Sealants in Acoustical Applications

C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing

C1658-06.....Glass Mat Gypsum Panels

C1396-06.....Gypsum Board

E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Gypsum Board: ASTM C1396, Type X, 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 12, 16, or 24 inches wide by required lengths one inch thick with paper faces treated to resist moisture.

C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 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 C1396, Type X, water-resistant core, 5/8 inch thick.

2.3 ACCESSORIES

A. ASTM C1047, except form of 0.015 inch thick zinc coated steel sheet or rigid PVC plastic.

B. Flanges not less than 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 0.33 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. Full height partitions shown (FHP).
   d. Corridor partitions.
2. One side of partitions or furring:
   a. Inside of exterior wall furring or stud construction.
3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.

3.2 INSTALLING GYPSUM BOARD

A. Coordinate installation of gypsum board with other trades and related work.

B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.

C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.

D. Use gypsum boards in maximum practical lengths to minimize number of end joints.

E. Bring gypsum board into contact, but do not force into place.

F. Ceilings:
   1. For single-ply construction, use perpendicular application.
   2. For two-ply assembles:
      a. Use perpendicular application.
      b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

G. Walls (Except Shaft Walls):
   1. When gypsum board is installed parallel to framing members, space fasteners 12 inches on center in field of the board, and 8 inches on center along edges.
   2. When gypsum board is installed perpendicular to framing members, space fasteners 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. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply application requirements.
   7. 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 30 feet.

c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

I. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
   a. Install at all vertical and horizontal external corners and where shown.
   b. Use screws only. Do not use crimping tool.
4. Edge Trim (Casings Beads):
   a. At both sides of expansion and control joints unless shown otherwise.
   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 3/8 inch from ends and edges of sheathing and 8 inches on center. Space screws a maximum of 8 inches on center on intermediate framing members.

D. Apply 2 foot by 8 foot sheathing boards horizontally with tongue edge up.

E. Apply 4 ft. by 8 ft. or 9 foot gypsum sheathing boards vertically with edges over framing.

3.4 CAVITY SHAFT WALL

A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.

B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing for two-hour fire rating. Conform to FM WALL CONSTRUCTION 25-1/HR (Non-loadbearing) for one-hour fire rating where shown.

C. Cut coreboard (liner) panels one inch less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
   1. Where shaft walls exceed 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 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 one inch long screws, spaced 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 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 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 1/8-inch are not permitted unless shown.
   2. Align shaft walls for plumb vertical flush alignment from top to bottom of shaft.

3.5 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.

B. Before proceeding with installation of finishing materials, assure the following:
   1. Gypsum board is fastened and held close to framing or furring.
   2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated smoke barrier, fire gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated construction. Sanding is not required of non-decorated surfaces.

3.6 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.

B. Patch holes or openings 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 1/2 inch diameter, or equivalent size, with 5/8 inch thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction fire protection equivalent to the fire rated construction.

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SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies ceramic, porcelain tile, crack isolation membranes and tile backer board.

1.2 RELATED WORK

A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

B. Color, texture and pattern of field tile, size of field tile and color of grout specified: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Metal and resilient edge strips at joints with new resilient flooring: 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, 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.

C. Product Data:

1. Ceramic and porcelain tile, marked to show each type, size, and shape required.
2. Cementitious backer unit.
3. Dry-set Portland cement mortar and grout.
4. Leveling compound.
5. Elastomeric membrane and bond coat.
6. Reinforcing tape.
7. Latex-Portland cement mortar and grout.
8. Fasteners.

D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
   a. Cementitious backer unit.
   b. Dry-set Portland cement mortar and grout.
   c. Elastomeric membrane and bond coat.
   d. Reinforcing tape.

e. Leveling compound.

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):

A108.1A-11.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar

A108.1B-11.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar

A108.1C-11.....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

A137.1-08.....Ceramic Tile

C. American Society For Testing And Materials (ASTM):

A185-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcing

C109/C109M-11.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)

C241-09.....Abrasion Resistance of Stone Subjected to Foot Traffic

C348-08.....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars

C627-10.....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

C954-11.....Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness

C979-10.....Pigments for Integrally Colored Concrete

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Panel Products

C1027-09.....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

C1127-09.....Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface

C1178/C1178M-11.....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

C1325-08.....Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

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

D5109-99(R2004).....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.
      b. Class V, 12000 revolutions for floors in Corridors, Kitchens, Storage including Refrigerated Rooms
      c. Class IV, 6000 revolutions for remaining areas.
   3. Slip Resistant Tile for Floors:
      a. Coefficient of friction, when tested in accordance with ASTM C1028, required for level of performance:
         1) Not less than 0.7 (wet condition) for bathing areas.
         2) Not less than 0.8 on ramps for wet and dry conditions.
         3) Not less than 0.6, except 0.8 on ramps as stated above, for wet and dry conditions for other areas.

b. Tile Having Abrasive Grains:
1. Unglazed Ceramic Mosaic Tile: Abrasive grains throughout body of the tile.
c. Porcelain Tile: Matte surface finish.
4. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
5. Do not use back mounted tiles in showers unless certified by manufacturer as noted in paragraph 1.3.D.
6. 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.
7. 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.

B. Unglazed Ceramic Mosaic Tile: Nominal 1/4 inch thick with cushion edges.
C. Glazed Wall Tile: Cushion edges, glazing, as specified in Section 09 06 00, SCHEDULE FOR FINISHES.
D. Porcelain Tile: Nominal 5/16 inch thick, with cushion edges. Porcelain tile produced by the dust pressed method shall be made of approximately 50% feldspar; the remaining 50% shall be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of between 390 to 400 pounds.

2.2 CEMENTITIOUS BACKER UNITS

A. Use in showers or wet areas.
B. ASTM C1325.
C. Use Cementitious backer units in maximum available lengths.

2.3 JOINT MATERIALS FOR CEMENTITIOUS BACKER UNITS

A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 2 inches wide. Tape with pressure sensitive adhesive backing will not be permitted.
B. Tape Embedding Material: Latex-Portland cement mortar complying with ANSI A108.1.
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 7/16 inch diameter head, corrosion resistant coated, with washers.
3. ASTM C954 for steel 0.033 inch thick.
4. ASTM C1002 for steel framing less than 0.0329 inch thick.

B. Washers: Galvanized steel, 1/2 inch minimum diameter.

2.5 GLASS MAT WATER RESISTANT GYPSUM BACKER BOARD

Confirm 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. Dry-Set Portland Cement Mortar: ANSI A108.1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A108.4.

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. Dry-Set Grout: ANSI A108.1 color as specified.

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 - 3500 psig per ASTM C109/C109M.
2. Flexural strength - 1000 psig per ASTM C348 (28 day value).
3. Tensile strength - 600 psi per ANSI 118.7.
4. Density – 1.9.

C. Capable of being applied in layers up to 1-1/2 inches thick without fillers and up to 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 WATER

Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.10 CLEANING COMPOUNDS

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic material not acceptable.

2.11 POLYETHYLENE SHEET

A. Polyethylene sheet conforming to ASTM D4397.

B. Nominal thickness: 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 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 100 degrees F.

D. Do not install materials when the temperature of the substrate is below 60 degrees F.

E. Do not allow temperature to fall below 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 1/4 inch in 10 feet from required elevation where Portland cement mortar setting bed is used.
2. Not more than 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 1/4 inch in eight feet from required plane where Portland cement mortar setting bed is used.
2. Not more than 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.
      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 1/16 inch per foot.
   3. Allow not less than 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. 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 3/8 inch to 5/8 inch thick over solid backing.
      2) 5/8 to 3/4 inch thick on metal lath over studs.
   d. Apply scratch and leveling coats more than 3/4 inch thick in two coats.

E. Existing Floors and Walls:
1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.

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 A108.1 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 eight inches on center and not closer than 1/2 inch from the edge of the backer unit or as recommended by backer unit manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.
E. Do not install joint treatment for seven days after installation of cementitious backer unit.
F. Joint Treatment:
1. Fill horizontal and vertical joints and corners with latex-Portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.

2. Leave 1/4 inch space for sealant at lips of 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 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. Setting Beds or Bond Coats:

1. Set floor tile in elastomeric bond coat over elastomeric membrane ANSI 108. 13, TCA System F122 for all ceramic tile installations.
2. Set wall tile installed over glass mat water-resistant gypsum backer board in dry-set mortar, ANSI A108.1B, TCA System W243.

D. Workmanship:

1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field. Align new tile work scheduled for existing spaces to the existing tile work unless specified otherwise.
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 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work shall be free from hollow sounding areas and 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.
d. Shove and vibrate tiles over 8 inches square to achieve full support of bond coat.

9. Walls:
a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights shown with tile.
b. Finish reveals of openings with tile, except where other finish materials are shown or specified.
c. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.

10. Joints:
a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
b. Make joints 1/16 inch wide for glazed wall tile and mosaic tile work.
c. Make joints in porcelain tile; maximum 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 composed of tiles 8 by 8 inches or larger.

3.7 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR

A. Installation of Tile: ANSI A108.1, except as specified otherwise.
B. Slope tile work to drains not less than 1/8 inch per foot.

3.8 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT

A. Surface Preparation: Prepare surfaces as specified in paragraph 3.3G
B. Installation of Elastomeric Membrane: ANSI A108.1 and TCA F122-02.
1. Prime surfaces, where required, in accordance with manufacturer's instructions.
2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 30 to 50 mils.
3. Extend material over flashing rings of drains and turn up vertical surfaces not less than four inches above finish floor surface.

4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 50 to 75 mils.
5. After curing test for leaks with one inch of water for 24 hours.

C. Installation of Tile in Elastomeric Membrane:
1. Spread no more material than can be covered with tile before material starts to set.
2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

3.9 GROUTING

A. Grout Type and Location:
1. Grout for porcelain tile and unglazed mosaic tile: dry-set grout, or commercial Portland cement grout.

B. Workmanship:
1. Install and cure grout in accordance with the applicable standard.
2. Portland Cement grout: ANSI A108.1.
3. Dry-set grout: ANSI A108.1.

3.10 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.

3.11 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.

3.12 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 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.

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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.

1.2 RELATED WORK

A. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Ceiling suspension system, each type, showing complete details of installation
2. Acoustical units, each type

C. 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-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

C423-07.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C634-02 (E2007).....Standard Terminology Relating to Environmental Acoustics

C635-04.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

C636-06.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

E84-07.....Surface Burning Characteristics of Building Materials
E119-07.....Fire Tests of Building Construction and Materials
E413-04.....Classification for Rating Sound Insulation.
E580-06.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
E1264-(R2005).....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 the following unless specified otherwise.
      a. Galvanized cold-rolled steel, bonderized.
   2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.
B. Exposed grid suspension system for support of lay-in panels:
   1. Exposed grid width not less than 7/8 inch with not less than 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.

2.2 WIRE

A. ASTM A641.
B. For wire hangers: Minimum diameter 0.1055 inch.
C. For bracing wires: Minimum diameter 0.1350 inch.

2.3 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. 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 5/8 inch wide by 3/8 inch high over top of wire.

c. Wire 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.

2.4 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 Inches	Cold-rolled Pound	Hot-rolled Pound
1 1/2	475	1120
2	590	1260

2.5 ACOUSTICAL UNITS

A. General:

1. Ceiling Tile shall meet minimum 37% bio-based content in accordance with USDA Bio-Preferred Product requirements.
2. ASTM E1264, weighing 3/4 psf minimum for mineral fiber panels or tile.
3. Class A Flame Spread: ASTM 84
4. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
5. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.
6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces.
7. Lay-in panels: Sizes as shown, with reveal edges.
8. Finish shall be factory applied latex paint with factory-applied plastic finish.
9. Colors and manufacturers shall be as noted in 090600 spec.

B. Type III-A Units - Mineral base with painted finish.

1. Form 1, modular, cast or molded.
2. Minimum NRC of 0.75.
3. Minimum thickness of 3/4 inch and weight of one pound per square foot.

2.6 ACCESSORIES

A. Hold-down clips:
1. Clips shall be provided by the ceiling tile manufacturer for the grid and tile specified.
2. All negative pressure rooms with acoustical tile ceilings shall be provided with ceiling tile hold-down clips.

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, 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 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.

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 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 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 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 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.

C. 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, 4 feet on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

D. Indirect Hung Suspension System:

1. As illustrated in ASTM C635.
2. Space carrying channels for indirect hung suspension system not more than 4 feet on center. Space hangers for carrying channels not more than 8 feet on center or for carrying channels less than 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 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 58 00

CLEANROOM CEILING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Metal Pan Ceiling Panels
2. Exposed Ceiling Grid

1.2 SUBMITTALS

A. Shop Drawings: Submit shop drawings with ceiling grid layout indicated including details for construction and materials used.

B. Product Data: Submit to the Owner's Representative full descriptive literature indicating compliance with the contract requirements.

C. Samples:

1. Submit 12" x 12" approved samples of materials to the Owner's Representative for verification of installed products.
2. Submit physical samples of each ceiling material.

D. Certification: Submit typed, signed, certificates of compliance from finish material manufacturers that materials meet flame spread requirements.

1.3 REPLACEMENT MATERIAL

A. Provide replacement material in a box that is considered manufacturer's standard carton. Furnish four boxes each type to the Owner's Representative for replacing damaged tile.

PART 2 - PRODUCTS

2.1 INFILL PANELS

A. Infill panels shall be lay-in type, 0.040” unperforated metal panel with smooth factory finish.

1. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635.
2. Recycled Content: Not less than 23 percent postconsumer recycled content and 1.5 percent preconsumer recycled content.

B. Basis of design model and manufacturer:

1. Unitee CR Series, Price Industries.
2. Approved Equal.

2.2 EXPOSED CEILING GRID

A. The suspension system shall be extruded aluminum tee main and cross tees complete with integral extruded vinyl gasket along all flanges.
B. The system shall consist of 12 ft. main tees spaced 4 ft. on center. Cross tees shall be nominal 4 ft. Tees shall be regimented to provide exact location of cross tees.
C. All grid members must assemble using two-piece universal assembly clips that enable the grid to be assembled and/or removed without the use of tools.
D. The perimeter mold shall be extruded aluminum profile #4733 complete with integral extruded vinyl gasket along face flange and vertical stack at wall.
E. All tiles shall be secured with hold-down clips provided by the ceiling manufacturer.
F. The finish on all exposed surfaces must be smooth sterile white - thermal setting selected for its exceptional durability and resistance to chemical cleaning and germicides.
G. Low-Emitting Materials: Acoustical tile ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
H. Basis of design model and manufacturer:
   1. Unitee CR Series, Price Industries.
   2. Approved Equal.

PART 3 - EXECUTION

3.1 INSPECTION/EXAMINATION

A. The Contractor shall examine all openings, mechanical and electrical work, and adjoining and adjacent construction prior to commencing this Work.
B. This Contractor shall field verify rough opening dimensions as required in submittals and ceiling conditions to be plumb and level with square corners to receive ceiling systems.
C. The General Contractor shall coordinate corrective/remedial work promptly.
D. Proceeding with this Work indicates this Contractor accepts the openings and conditions.

3.2 INSTALLATION

A. Install all components in accordance to the manufacturer's instructions and in accordance to ASTM C 636.
B. Main grid member are to be suspended on #12 gauge pre-stressed hanger wire at 4 ft. centers.
C. Maximum allowable deflection shall not exceed L/360.
D. Install ceilings to heights indicated on the plans and specifications to a tolerance of 1/8" in 12'-0”.
E. Installation of the ceiling shall take place only after the temperature is maintained at normal occupancy temperature and the relative humidity is maintained below 40%

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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 rubber base, stair treads, rubber flooring and resilient accessories

1.2 RELATED WORK

A. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHESS.

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 and stair material manufacturer's recommendations for adhesives.
3. Application and installation instructions.

C. Samples:

1. Base and Molding Accessory: 6 inches long, each type and color.
2. Resilient Stair Treads: 6 inches long.
3. Sheet Rubber Flooring: 12 inches square.
4. 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):

F1344-10.....Rubber Floor Tile
F1859-10.....Rubber Sheet Floor Covering without Backing
F1860-10.....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. ASTM F1861, 1/8 inch thick, 4 inches high, rubber.

B. Where carpet occurs, use Style A-straight.

C. Use only one type of base throughout.

2.3 RESILIENT VINYL MOLDING ACCESSORY AND TREADS

A. Fed. Spec. RR-T-650, Composition A, Type 2, 3/16 inch thick on wear surface tapering to 1/8 inch thick at riser end.

B. Nosing shape to conform to sub-tread nosing shape.

C. Profile and Dimensions: As indicated.

D. Locations: Provide vinyl molding accessories in areas indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 SHEET RUBBER FLOORING

A. ASTM F1344, F1859 or F1860, 900 mm (36 inches) wide, 1/8 inch thick, smooth face, material by the same manufacturer as the rubber treads, color and pattern to match treads.

B. Use for stair landings.

C. Use rubber flooring made with a minimum of 90% consumer rubber where possible.

2.5 PRIMER (FOR CONCRETE FLOORS)

As recommended by the adhesive and tile manufacturer.

2.6 LEVELING COMPOUND (FOR CONCRETE FLOORS)

Provide products with latex or polyvinyl acetate resins in the mix.

2.7 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 70 °F, for 48 hours before installation.

B. Maintain temperature of rooms where work occurs, between 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 Project Manager.

B. Submit proposed installation deviation from this specification to the Project Manager indicating the differences in the method of installation.

C. The Project Manager 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 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 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 STAIR TREAD INSTALLATION

A. Prepare surfaces to receive the treads in accordance with applicable portions of paragraph, preparation.

B. Layout of Treads.
   1. No joints will be accepted in treads.
   2. Set full treads on intermediate and floor landings.

C. Application:
   1. Apply adhesive uniformly with no bare spots.
   2. Roll and pound treads to assure adhesion.

3.6 SHEET RUBBER INSTALLATION.

A. Prepare surfaces to receive sheet rubber in accordance with applicable portions of paragraph, preparation.

B. Layout of Sheet Rubber:
   1. Use minimum number of joints compatible with material direction and symmetrical joint location.
   2. Where sheet rubber intersect vertical stair members, other sheets, stair treads, and other resilient materials at the floor landings, material shall touch for the entire length within 0.005 inch.
   3. Install sheet rubber on floors and intermediate landings where resilient stair treads are installed; center joint with other flooring material under doors.

C. Application:
   1. Apply adhesive uniformly with no bare spots.
   2. Roll sheet rubber to assure adhesion.

3.7 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 Project Manager.

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.

1.2 RELATED WORK

A. Concrete floors: Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Color, pattern and texture: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Resilient base required over metal base of casework: Section 12 32 00, MANUFACTURED WOOD CASEWORK.

D. Resilient base over base of lockers, equipment and casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

E. Unbacked vinyl (homogenous) sheet flooring with welded seams: Section 09 65 16, RESILIENT SHEET FLOORING.

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):

E648-09.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source.

E662-09.....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.

F1869-04.....Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride

F1913-04.....Sheet Vinyl Flooring without Backing

F2170-09.....Determining Relative Humidity in Concrete Floor Slabs using In-situ Probes

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:

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. Manufacturer: Forestscapes as manufactured by Teknoflor or equal products by other manufacturers.

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 LINOLEUM

A. Test Data:

a. Flammability: meets or exceeds ASTM D648
b. Smoke density ASTM-662
c. Static load 450 lbs PSI
d. Slip Resistance: Meets ADA recommendations of .6 or flat surface.

B. Color and pattern uniformly distributed throughout tile.

C. Molded pattern wearing surface base thickness 1/10 inch thick.

D. 79” Wide

E. Manufacturers:

a. MCS as manufactured by Forbo Flooring Systems, 8 Maplewood Drive, Hazleton PA 18202, phone 1-800-842-7839 or equal products by other manufacturers.

2.5 ADHESIVES

Water resistant type recommended by the sheet flooring manufacturer for the conditions of use. VOC not to exceed 50g/L

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 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive or sheet flooring manufacturer.

2.9 EDGE STRIPS

A. Extruded aluminum, mill finish, mechanically cleaned.

B. 28 mm (1-l/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.

C. Drill and counter sink edge strips for flat head screws. Space holes near ends and approximately 225 mm (9 inches) on center in between.

2.10 SEALANT

A. As specified in Section 07 92 00, JOINT SEALANTS.

B. Compatible with sheet flooring.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of sheet flooring above 36 °C (65 °F), for 48 hours before installation.

B. Maintain temperature of rooms where sheet flooring work occurs above 36 °C (65 °F), for 48 hours, before installation and during installation.

C. After installation, maintain temperature at or above 36 °C (65 °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. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710.
   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. Slab substrates 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.

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 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 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. Moisture Testing: Perform moisture and pH test as recommended by the flooring and adhesive manufacturers. Perform test locations starting on the deepest part of the concrete structure. Proceed with installation only after concrete substrates meet or exceed the manufacturer’s requirements. In the absence of specific guidance from the flooring or adhesive manufacturer the following requirements are to be met:

1. Perform moisture vapor emission tests in accordance with ASTM F1869. Proceed with installation only after substrates have a maximum moisture-vapor-emission rate of 1.36 kg of water/92.9 sq. m (3lb of water/1000 sq. ft.) in 24 hours.
2. Perform concrete internal relative humidity testing using situ probes in accordance with ASTM F2170. Proceed with installation only after concrete reaches maximum 75 percent relative humidity level measurement.

H. Preparation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives. Coordinate with Asbestos Abatement Section if asbestos abatement procedures will be involved.

I. Remove existing resilient flooring and adhesive completely in accordance with Resilient Floor Covering Institute recommendations in manual RFCI-WP. Solvents shall not be used.

3.3 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 Project Manager 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.

3.4 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, Project Manager 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 Project Manager.

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

This section specifies the installation of vinyl composition tile flooring, rubber tile flooring, and accessories.

1.2 RELATED WORK

A. Color and pattern and location in room finish schedule: Section 09 06 00, SCHEDULE FOR FINISHES.

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: 12 inches by 12 inches for each type, pattern and color.
2. Edge Strips: 6 inches long, each type.
3. Feature Strips: 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

E648-10.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

E662-09.....Specific Optical Density of Smoke Generated by Solid Materials

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

F510-93 (R 2008).....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 (R2010).....Vinyl Composition Floor Tile

F1344-10.....Rubber Floor Tile

F1700-04 (R2010).....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 2 (through pattern), 12 inches square, 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. 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 9 inches on center between.

D. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl.

PART 3 – EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain temperature of materials a minimum of 70 °F, for 48 hours before installation.

B. Maintain temperature of rooms where work occurs between °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. 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:

1. 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 100 pound roller. No exceptions.
3. The Project Manager 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 Project Manager. 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 Project Manager.
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 23.20
RESINOUS (EPOXY BASE) WITH VINYL CHIP BROADCAST (RES-2)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies Resinous (Resinous epoxy base with vinyl chip flake broadcast) flooring with integral cove base:
   1. Res-2 Resinous (epoxy) vinyl chip flake broadcast flooring system.

1.2 RELATED WORK

A. Concrete and Moisture Vapor Barrier: Section 03 30 00, CAST-IN-PLACE CONCRETE.
B. Color and location of each type of resinous flooring: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
C. Floor Drains: Division 22, PLUMBING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data:
   1. Description of each product to be provided.
   2. Application and installation instructions.
   3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.
C. Qualification Data: For Installer.
D. Sustainable Submittal:
   1. Product data for products having recycled content, submit documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
      a. Include statements indicating costs for each product having recycled content.
   2. Product data for field applied, interior, paints, coatings, and primers, include printed statement of VOC content indicating compliance with environmental requirements.
E. Samples:
   1. Each color and texture specified in Section 09 06 00, SCHEDULE FOR FINISHES.
   2. Samples for verification: For each (color and texture) resinous flooring system required, 6 inches square, applied to a rigid backing by installer for this project.
   3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces.

Finished flooring must match the approved samples in color and texture.

F. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
   1. Edge configuration.
G. Certifications and Approvals:
   1. Manufacturer's certification of material and substrate compliance with specification.
   2. Manufacturer's approval of installer.
   3. Contractor's certificate of compliance with Quality Assurance requirements.
H. Warranty: As specified in this section.

1.4 QUALITY ASSURANCE

A. Manufacture Certificate: Manufacture shall certify that a particular resinous flooring system has been manufactured and in use for a minimum of five (5) years.
B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a minimum period of five (5) years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
   1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
   2. Contractor shall have completed at least ten (10) projects of similar size and complexity. Include list of at least five (5) projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
   3. Installer's Personnel: Employ persons trained for application of specified product.
C. Source Limitations:
   1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
   2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.
D. Pre-Installation Conference:
   1. Convene a meeting not less than thirty days prior to starting work.

2. Attendance:
   a. Contractor
   b. VA Project Manager
   c. Manufacturer and Installer's Representative
3. Review the following:
   a. Environmental requirements
      1) Air and surface temperature
      2) Relative humidity
      3) Ventilation
      4) Dust and contaminates
   b. Protection of surfaces not scheduled to be coated
   c. Inspect and discuss condition of substrate and other preparatory work performed
   d. Review and verify availability of material; installer’s personnel, equipment needed
   e. Design and edge conditions.
   f. Performance of the coating with chemicals anticipated in the area receiving the resinous (urethane and epoxy mortar/cement) flooring system
   g. Application and repair
   h. Field quality control
   i. Cleaning
   j. Protection of coating systems
   k. One-year inspection and maintenance
   l. Coordination with other work

E. Manufacturer’s Field Services: Manufacturer’s representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.

1.5 MATERIAL PACKAGING DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
C. Maintain temperature of storage area between 60 and 80 degrees F.
D. Keep containers sealed until ready for use.
E. Do not use materials beyond manufacturer’s shelf life limits.
F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire

package or packages. No On site weighing or volumetric measurements are allowed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring applications.

1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

D. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

1.7 WARRANTY

A. Work subject to the terms of the Article “Warranty of Construction”.

B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for a extended period of three (3) full years from date of installation, or provide a joint and several warranty signed on a single document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of three (3) full years from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

1.8 APPLICABLE PUBLICATIONS

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

B. ACI (American Concrete Institute):
Comm. 503.1-92.....Four Epoxy Specifications (Reapproved 2003).

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

C109.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2” or 50 mm Cube Specimens)

C150.....Standard Specification for Portland Cement

C219-07a.....Standard Terminology Relating to Hydraulic Cement

C267-01(2006).....Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes

C307-03 (2008).....Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings

C413-01(2006).....Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes

C501-84(2002).....Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

C579-01(2006).....Standard Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C580-02(2008).....Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C722-04.....Standard Specification for Chemical-Resistant Monolithic Floor Surfacings

C811-98(2008).....Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacings

C881/C881M-02.....Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

D1308-02(2007).....Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D1652-04.....Standard Test Method for Epoxy Content of Epoxy Resins

D2240-05.....Standard Test Method for Rubber Property — Durometer Hardness

D4060-07.....Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

E162-09.....Standard Test Method for Surface Flammability of Using a Radiant Heat Energy Source

E648-09a.....Standard Test Method for Critical Radiant Flux of Floor- Covering Systems Using a Radiant Heat Energy Source

F1869-09.....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

D. Military Specification (Mil Spec):

MIL-PRF-3134.....Para. 4.7.3, Indentation, No Cracking or Loss of Bond Water Absorption

MIL-PRF-23003A.....Para. 4.6.11, Resistance to Immersion

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

AMP 501.....Finishes for Aluminum

F. National Fire Protection Association (NFPA):

56A.....Inhalation Aesthetics replaced by NFPA 99 Standard for Health Care Facilities

G. The Society For Protective Coatings (SSPC):

SP6.....Commercial Blast Cleaning

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION FOR RES-2 (BROADCAST VINYL CHIP FLAKE)

A. System Descriptions:

1. Monolithic, multi-component epoxy chemistry resinous flooring system. Primer with broadcast quartz aggregates, High performance multi-component solvent free epoxy undercoat, Vinyl chip flake broadcast media in desired flake size (1/8”, 1/4”). High performance multi component epoxy and solvent free sealers.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers of broadcast and installation method. Verify compatibility with substrate. Use manufacturer’s standard components, compatible with each other and as follows:

1. Primer with Broadcast quartz (primer coat):

a. Resin: epoxy.

b. Formulation Description: Multiple component high solids.

c. Application Method: squeegee, back roll and broadcast.

d. Thickness of coat(s): 2-3mil.

e. Number of Coats: One.

f. Aggregates: Quartz broadcast into wet epoxy primer.

2. Undercoat: (body coat)

a. Resin: Epoxy.

b. Formulation Description: Pigmented multi-component, high solids.

c. Application Method: Notched squeegee and Back roll

d. Number of Coats: One.

e. Aggregates: vinyl chip flake broadcast into wet Undercoat.

f. Thickness of coat(s): 20-30mil.

g. Number of Coats: One.

3. Sealer coat:

a. Resin: Epoxy.

b. Formulation Description: Multiple component high solids, no solvent UV stable.

c. Type/Finish: Clear Gloss.

d. Thickness of coat(s): 2-3mil.

e. Number of Coats: (2) two.

f. Application: Squeegee and finish roll.

D. Physical Properties:

1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Tensile Strength	ASTM D638	5,200 psi
Volatile Organic Compound Limits (V.O.C.)	EPA & LEED	Below 100 g/l
Flexural Strength	ASTM D790	4,000 psi
Water Absorption	ASTM C413	0.056%
Coefficient of friction dry/slip index wet	ASTM D2047	>.79 dry >.65 wet
Impact Resistance	ASTM D4226	> 160 in. lbs
Abrasion Resistance	ASTM D4060 CS-17	0.03 gm maximum weight loss
Thermal Coefficient of Linear Expansion	ASTM C531	17×10^{-6} in/in °F
Hardness Shore D	ASTM D2240	85 to 90
Bond Strength	ASTM D7234	>300 psi 100% concrete failure
Chemical Resistance of the following:	ASTM D1380	No Effect
Acetic acid	5 percent	
Ammonium hydroxide	10 percent	
Citric Acid	50 percent	
Fatty acid Motor Oil, 20W		
Hydrochloric acid		
Salt water	10 percent	
Sodium Hydroxide		
Sulfuric acid	10 percent	
Trisodium phosphate	10 percent	
	5 percent	
Urine		
Feces		
Hydrogen peroxide	28 percent	
Distilled Water		
Sodium Hypochloride	5.28 percent	

E. System Characteristics:

1. Color and Pattern: As selected by VA Project Manager from manufacturer's standard colors.
2. Integral cove base: 1 inch radius epoxy mortar cove keyed into concrete substrate and or resinous flooring mortar system. No fillers integral cove base must be troweled in place with specified resinous mortar base.
3. Overall System Thickness: Nominal 3/16 to 1/4 inches.
4. Finish: Anti-slip resistant.

5. Temperature Range: Systems vary by manufacturer; approximate range from a minimum of 45 to 150 degrees F.

F. Physical Properties:

1. Physical Properties of flooring system when tested as follows:

2.2 SUPPLEMENTAL MATERIALS

A. Textured Top Coat: Type recommended or produced by manufacturer of seamless resinous flooring system, slip resistance type and profile for desired final finish.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.

C. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous flooring for conditions as specified.

D. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc.

E. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resinous based materials only. Cementitious or single component product are not expectable.

2.3 TROWELED COVE BASE

A. Same physical properties as specified resinous mortar system.

2.4 BASE CAP STRIP

A. Aluminum, Extruded: ASTM B221, Alloy 6063-T6.

B. Shape for 3/16 inch (4.76 mm) depth of base material, "J" configuration.

C. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.

2. Aluminum: NAAMM Amp 501:

a. Clear anodic coating, AA-C22A41 chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where monolithic resinous system with integral base is to be installed with the VA Project Manager.

B. Moisture Vapor Emission Testing: Perform moisture vapor transmission testing in accordance with ASTM F1869 to determine the MVER of the substrate prior to commencement of the work. See section 3.4.B.3.

3.2 PROJECT CONDITIONS

A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F for at least 48 hours, before, during, and

24 hours after installation. Maintain temperature at least 70 degrees F during cure period.

B. Maintain relative humidity less than 75 percent.

C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

D. Maintain proper ventilation of the area during application and curing time period.

1. Comply with infection control measures of the VA Medical Center.

3.3 INSTALLATION REQUIREMENTS

A. The manufacturer's instructions for application and installation shall be reviewed with the VA Project Manager for the seamless resinous (urethane and epoxy mortar) flooring system with integral cove base.

B. Substrate shall be approved by manufacture technical representative.

3.4 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Prepare concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re circulates the shot by vacuum pickup.

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 anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

b. MVT threshold for monolithic resinous flooring shall not exceed 3 lbs/1000 square feet in a 24 hour period.

c. When MVT emission exceeds this limit, apply manufacturer’s recommended vapor control primer or other corrective measures as recommended by manufacturer prior to application of flooring or membrane systems.

d. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75-80 percent.

e. Provide a written report showing test placement and results.

4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for flooring manufacturer recommended joint fill material, and concrete crack treatment.

F. Prepare wall to receive integral cove base:

1. Verify wall material is acceptable for resinous flooring application, if not, install material (e.g. cement board) to receive base.
2. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane, and/or crack isolation membrane) as recommended by resinous flooring manufacturer.
3. Install base prior to flooring if required by resinous flooring manufacturer.
4. Grind, cut or sand protrusions to receive base application.

3.5 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate for all areas to receive integrated cove base.

C. Apply cove base: Trowel to wall surfaces at a 1 inch radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.

D. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate.

E. Trowel mortar base: Mix mortar material according to manufacturer's recommended procedures. Climatic and non-climatic resinous flooring systems may vary slightly on mode of application. Application should be based upon the following: Uniformly spread mortar over substrate using a specially designed screed box adjusted to manufacturer's recommended height. Metal trowel (hand or power) single mortar coat in thickness indicated for flooring system, grout to fill substrate voids. When cured, sand to remove trowel marks and roughness.

F. Broadcast: Immediately broadcast quartz silica aggregate into the primer using manufacturer's spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

G. Under Coat: Mix base material according to manufacturer's recommended procedures. Uniformly spread mixed material over previously primed substrate using manufacturer's installation tool. Roll material with strict adherence to manufacturer's installation procedures and coverage rates.

H. Broadcast: Immediately broadcast vinyl flakes into the body coat. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

I. First Sealer: Remove excess un-bonded flakes by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.

J. Second Sealer: Lightly sand first sealer coat. Mix and apply second sealer coat with strict adherence to manufacturer's installation procedures.

3.6 TOLERANCE

A. From line of plane: Maximum 1/8 inch) in total distance of flooring and base. Broadcast resinous flooring system will contour substrate. Deviation and tolerance are subject to concrete tolerance.

B. From radius of cove: Maximum of 1/8 inch plus or 1/16-inch minus.

3.7 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous flooring materials from damage and wear during construction operation.

1. Cover flooring with kraft type paper.
2. Optional 1/4 inch thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.

D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

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SECTION 09 68 10
CARPET TILE

PART 1 - GENERAL

1.1 DESCRIPTION

Section specifies carpet tile, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK

A. Color and texture of carpet and edge strip: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Resilient wall base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 QUALITY ASSURANCE

A. Carpet installed by mechanics certified by the Floor Covering Installation Board.

B. Certify and label the carpet that it has been tested and meets criteria of CRI IAQ Carpet Testing Program for indoor air quality.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Product Data:

1. Manufacturer’s catalog data and printed documentation stating physical characteristics, durability, resistance to fading and flame resistance characteristics for each type of carpet material and installation accessory.
2. Manufacturer’s printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.
3. Manufacturer’s certificate verifying carpet containing recycled materials include percentage of recycled materials as specified.

C. Samples:

1. Carpet: "Production Quality" samples 24 x 24 inches of carpets, showing quality, pattern and color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Floor Edge Strip (Molding): 150 mm (6 inches) long of each color and type specified.
3. Base Edge Strip (Molding): 150 mm (6 inches) long of each color specified.

D. Shop Drawings: Installers layout plan showing seams and tile layout for carpet tile.

E. Maintenance Data: Carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.

1.5 DELIVERY AND STORAGE

A. Deliver carpet in manufacturer's original wrappings and packages clearly labeled with manufacturer's name, brand, name, size, dye lot number and related information.

B. Deliver adhesives in containers clearly labeled with manufacturer's name, brand name, number, installation instructions, safety instructions and flash points.

C. Store in a clean, dry, well ventilated area, protected from damage and soiling. Maintain storage space at a temperature above 16 degrees C (60 degrees F) for 2 days prior to installation.

1.6 ENVIRONMENTAL REQUIREMENTS

Areas in which carpeting is to be installed shall be maintained at a temperature above 16 degrees C (60 degrees F) for 2 days before installation, during installation and for 2 days after installation. A minimum temperature of 13 degrees C (55 degrees F) shall be maintained thereafter for the duration of the contract. Traffic or movement of furniture or equipment in carpeted area shall not be permitted for 24 hours after installation. Other work which would damage the carpet shall be completed prior to installation of carpet.

1.7 WARRANTY

Carpet and installation subject to terms of "Warranty of Construction" except that warranty period is extended to two years.

1.8 APPLICABLE PUBLICATIONS

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

B. American National Standards Institute (ANSI):
ANSI/NSF 140-10.....Sustainable Carpet Assessment Standard

C. American Association of Textile Chemists and Colorists (AATCC):
AATCC 16-04.....Colorfastness to Light
AATCC 129-10.....Colorfastness to Ozone in the Atmosphere under High Humidities
AATCC 134-11.....Electric Static Propensity of Carpets
AATCC 165-08.....Colorfastness to Crocking: Textile Floor Conerings-AATCC Crockmeter Method

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

ASTM D1335-05.....Tuft Bind of Pile Yarn Floor Coverings
ASTM D3278-96 (R2004)...Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D5116-10.....Determinations of Organic Emissions from Indoor Materials/Products
ASTM D5252-05.....Operation of the Hexapod Tumble Drum Tester
ASTM D5417-05.....Operation of the Vettermann Drum Tester
ASTM E648-10.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

E. The Carpet and Rug Institute (CRI):
CRI 104-11.....Installation of Commercial Carpet

PART 2 - PRODUCTS

2.1 CARPET

A. Physical Characteristics:
1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Manufacturers standard construction commercial carpet:
   a. Modular Tile: 660 mm (24 inches) square tile.
3. Provide static control to permanently control static build up to less than 3.0 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Pile Height: Maximum 3.91 mm (0.10 inch).
5. Pile Fiber: Nylon with recycled content 25 percent minimum branded (federally registered trademark).
6. Pile Type: Level Loop.
7. Backing materials: Manufacturer’s unitary backing designed for glue-down installation using recovered materials.
8. Appearance Retention Rating (ARR): Carpet shall be tested and have the minimum 3.5-4.0 Severe ARR when tested in accordance with either the ASTM D 5252 (Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.
9. Tuft Bind: Minimum force of 40 N (10 lb) required to pull a tuft or loop free from carpet backing. Test per ASTM D1335.
10. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
11. Colorfastness to Ozone: Comply with AATCC 129, minimum rating of 4 on the AATCC color transfer chart.

12. Delamination Strength: Minimum of 440 N/m (2.5 lb/inch) between secondary backing.
13. Flammability and Critical Radiant Flux Requirements:
    a. Test Carpet in accordance with ASTM E 648.
    b. Class I: Not less than 0.45 watts per square centimeter.
    c. Class II: Not less than 0.22 watts per square centimeter.
    d. Carpet in corridors, exits and Medical Facilities: Class I.
14. Density: Average Pile Yarn Density (APYD):
    a. Corridors, lobbies, entrances, common areas or multipurpose rooms, open offices, waiting areas and dining areas: Minimum APYD 6000.
    b. Other areas: Minimum APYD 4000.
15. VOC Limits: Use carpet and carpet adhesive that comply with the following limits for VOC content when tested according to ASTM D 5116:
    a. Carpet, Total VOCs: 0.5 mg/sq.m x hr.
    b. Carpet, 4-PC (4-Phenylcyclohexene): 0.05 mg/sq.m x hr.
    c. Carpet, Formaldehyde: 0.05 mg/sq.m x hr.
    d. Carpet, Styrene: 0.4 mg/sq.m x hr.
    e. Adhesive, Total VOCs: 10.00 mg/sq.m x hr.
    f. Adhesive, Formaldehyde: 0.05 mg/sq.m x hr.
    g. Adhesive, 2-Ethyl-1-Hexanol: 3.00 mg/sq.m x hr.

B. Shall meet platinum level of ANSI/NSF 140.

C. Color, Texture, and Pattern: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.

2.2 ADHESIVE AND CONCRETE PRIMER

A. Waterproof, resistant to cleaning solutions, steam and water, nonflammable, complies with air-quality standards as specified. Adhesives flashpoint minimum 60 degrees C (140 degrees F), complies with ASTM D 3278.

B. Seam Adhesives: Waterproof, non-flammable and non-staining.

2.3 SEAMING TAPE

A. Permanently resistant to carpet cleaning solutions, steam, and water.

B. Recommended by carpet manufacturer.

2.4 EDGE STRIPS (MOLDING)

A. Metal:
    1. Hammered surface aluminum, pinless, clamp down type designed for the carpet being installed.
    2. Floor flange not less than 38 mm (1-/2 inches) wide, face not less than 16 mm (5/8 inch) wide.

3. Finish: Clear anodic coating unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Vinyl Edge Strip:
1. Beveled floor flange minimum 50 mm (2 inches) wide.
2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.
3. Color as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

A. Provide Portland cement bases polymer modifier with latex or polyvinyl acetate resin manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
B. Determine the type of underlayment selected for use by condition to be corrected.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Examine surfaces on which carpeting is to be installed.
B. Clean floor of oil, waxy films, paint, dust and deleterious substances that prevent adhesion, leave floor dry and cured, free of residue from curing or cleaning agents and existing carpet materials.
C. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.
D. Fill cracks, joints depressions, 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 joint lines.
E. Test new concrete subfloor prior to adhesive application for moisture and surface alkalinity per CRI 104 Section 6.3.1 or per ASTM E1907.

3.2 CARPET INSTALLTION

A. Do not install carpet until work of other trades including painting is complete and dry.
B. Install in accordance with CRI 104 direct glue down installation.
1. Relax carpet in accordance with Section 6.4.
2. Comply with indoor air quality recommendations noted in Section 6.5.
3. Maintain temperature in accordance with Section 15.3.
C. Secure carpet to subfloor of spaces with adhesive applied as recommended by carpet manufacturer.

D. Follow carpet manufacturer's recommendations for matching pattern and texture directions.

E. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations.

1. Bind or seal cut edge of sheet carpet and replace flanges or plates.
2. Use additional adhesive to secure carpets around pipes and other vertical projections.

F. Carpet Modules:

1. Install per CRI 104, Section 13, Adhesive Application.
2. Lay carpet modules with pile in same direction unless specified other wise in Section 09 06 00, SCHEDULE FOR FINISHES.
3. Install carpet modules so that cleaning methods and solutions do not cause dislocation of modules.
4. Lay carpet modules uniformly to provide tight flush joints free from movement when subject to traffic.

3.3 EDGE STRIPS INSTALLATION

A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.

B. Anchor metal strips to floor with suitable fasteners. Apply adhesive to edge strips, insert carpet into lip and press it down over carpet.

C. Anchor vinyl edge strip to floor with adhesive apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.4 PROTECTION AND CLEANING

A. Remove waste, fasteners and other cuttings from carpet floors.

B. Vacuum carpet and provide suitable protection. Do not use polyethylene film.

C. Do not permit traffic on carpeted surfaces for at least 48 hours after installation. Protect the carpet in accordance with CRI 104.

D. Do not move furniture or equipment on unprotected carpeted surfaces.

E. Just before final acceptance of work, remove protection and vacuum carpet clean.

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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.

1.2 RELATED WORK

A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY sections.

B. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Asphalt and concrete pavement marking: Section 32 17 23, PAVEMENT MARKINGS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. 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, 100 by 250 by 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, 4 inch by 10 inch face by 1/4 inch thick minimum, and where both flat and edge grain will be exposed, 10 inches long by sufficient size, 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. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
   c. Product type and color.
   d. Name of project.
5. Strips showing not less than 2 inch wide strips of undercoats and 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.

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 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 100 ft^2, selected by Project Manager.

B. Finish and texture approved by Project Manager 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.

B. American Conference of Governmental Industrial Hygienists (ACGIH):
ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

C. American National Standards Institute (ANSI):
A13.1-07.....Scheme for the Identification of Piping Systems

D. American Society for Testing and Materials (ASTM):
D260-86.....Boiled Linseed Oil

E. Commercial Item Description (CID):
A-A-1555.....Water Paint, Powder (Cementitious, White and Colors) (WPC) (cancelled)
A-A-3120.....Paint, For Swimming Pools (RF) (cancelled)

F. Federal Specifications (Fed Spec):
TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)

G. Master Painters Institute (MPI):
No. 1-12.....Aluminum Paint (AP)
No. 4-12.....Interior/ Exterior Latex Block Filler
No. 5-12.....Exterior Alkyd Wood Primer
No. 7-12.....Exterior Oil Wood Primer
No. 8-12.....Exterior Alkyd, Flat MPI Gloss Level 1 (EO)
No. 9-12.....Exterior Alkyd Enamel MPI Gloss Level 6 (EO)
No. 10-12.....Exterior Latex, Flat (AE)
No. 11-12.....Exterior Latex, Semi-Gloss (AE)
No. 18-12.....Organic Zinc Rich Primer
No. 22-12.....Aluminum Paint, High Heat (up to 590% - 1100F) (HR)
No. 26-12.....Cementitious Galvanized Metal Primer
No. 27-12.....Exterior / Interior Alkyd Floor Enamel, Gloss (FE)

No. 31-12.....Polyurethane, Moisture Cured, Clear Gloss (PV)
No. 36-12.....Knot Sealer
No. 43-12.....Interior Satin Latex, MPI Gloss Level 4
No. 44-12.....Interior Low Sheen Latex, MPI Gloss Level 2
No. 45-12.....Interior Primer Sealer
No. 46-12.....Interior Enamel Undercoat
No. 47-12.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5 (AK)
No. 48-12.....Interior Alkyd, Gloss, MPI Gloss Level 6 (AK)
No. 49-12.....Interior Alkyd, Flat, MPI Gloss Level 1 (AK)
No. 50-12.....Interior Latex Primer Sealer
No. 51-12.....Interior Alkyd, Eggshell, MPI Gloss Level 3
No. 52-12.....Interior Latex, MPI Gloss Level 3 (LE)
No. 53-12.....Interior Latex, Flat, MPI Gloss Level 1 (LE)
No. 54-12.....Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)
No. 59-12.....Interior/Exterior Alkyd Porch & Floor Enamel, Low Gloss (FE)
No. 60-12.....Interior/Exterior Latex Porch & Floor Paint, Low Gloss
No. 66-12.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC Approved) (FC)
No. 67-12.....Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR)
No. 68-12.....Interior/ Exterior Latex Porch & Floor Paint, Gloss
No. 71-12.....Polyurethane, Moisture Cured, Clear, Flat (PV)
No. 74-12.....Interior Alkyd Varnish, Semi-Gloss
No. 77-12.....Epoxy Cold Cured, Gloss (EC)
No. 79-12.....Marine Alkyd Metal Primer
No. 90-12.....Interior Wood Stain, Semi-Transparent (WS)
No. 91-12.....Wood Filler Paste
No. 94-12.....Exterior Alkyd, Semi-Gloss (EO)
No. 95-12.....Fast Drying Metal Primer
No. 98-12.....High Build Epoxy Coating
No. 101-12.....Epoxy Anti-Corrosive Metal Primer
No. 108-12.....High Build Epoxy Coating, Low Gloss (EC)
No. 114-12.....Interior Latex, Gloss (LE) and (LG)
No. 119-12.....Exterior Latex, High Gloss (acrylic) (AE)
No. 135-12.....Non-Cementitious Galvanized Primer
No. 138-12.....Interior High Performance Latex, MPI Gloss Level 2 (LF)

No. 139-12.....Interior High Performance Latex, MPI Gloss Level 3 (LL)

No. 140-12.....Interior High Performance Latex, MPI Gloss Level 4

No. 141-12.....Interior High Performance Latex (SG) MPI Gloss Level 5

H. Steel Structures Painting Council (SSPC):

SSPC SP 1-04 (R2004)....Solvent Cleaning

SSPC SP 2-04 (R2004)....Hand Tool Cleaning

SSPC SP 3-04 (R2004)....Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cementitious Paint (CEP): TT-P-1411A [Paint, Copolymer-Resin, Cementitious (CEP)], Type 1 for exterior use, Type II for interior use.

B. Wood Sealer: MPI 31 (gloss).

C. Plastic Tape:

1. Pigmented vinyl plastic film in colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES or specified.
2. Pressure sensitive adhesive back.
3. Widths as shown.

D. Identity markers options:

1. Pressure sensitive vinyl markers.
2. Snap-on coil plastic markers.

E. Interior/Exterior Latex Block Filler: MPI 4.

F. Exterior Latex, Flat (AE): MPI 10.

G. Exterior Latex, Semi-Gloss (AE): MPI 11.

H. Organic Zinc rich Coating (HR): MPI 22.

I. Interior Primer Sealer: MPI 45.

J. Interior Enamel Undercoat: MPI 47.

K. Interior Latex Primer Sealer: MPI 50.

L. Interior Latex, MPI Gloss Level 3 (LE): MPI 52.

M. Interior Latex, Flat, MPI Gloss Level 1 (LE): MPI 53.

N. Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE): MPI 54.

O. Wood Filler Paste: MPI 91.

P. Exterior Alkyd, Semi-Gloss (EO): MPI 94.

Q. High Build Epoxy Coating: MPI 98.

R. Epoxy Anti-Corrosive Metal Primer: MPI 101.

S. Waterborne Galvanized Primer: MPI 134.

T. Non-Cementitious Galvanized Primer: MPI 135.

U. Interior High Performance Latex, MPI Gloss Level 3 (LL): MPI 139.

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/QUALITY ASSURANCE

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 10g/l for interior latex paints/primers and 50g/l for exterior latex paints and primers.
2. Lead-Base Paint:
   a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
   b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
   c. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
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.
6. Use high performance acrylic paints in place of alkyd paints, where possible.
7. VOC content for solvent-based paints shall not exceed 250g/l and shall not be formulated with more than one percent aromatic hydro carbons by weight.

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 no exterior painting when it is windy and dusty.
4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
5. Apply only on clean, dry and frost free surfaces except as follows:
   a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
   b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.
6. Varnishing:
   a. Apply in clean areas and in still air.
   b. Before varnishing vacuum and dust area.
   c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 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 prefinished 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 wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
7. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
   a. Thin filler in accordance with manufacturer's instructions for application.
   b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.

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. Masonry, Concrete, Cement Board, Cement Plaster and Stucco:
1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
3. Remove loose mortar in masonry work.
4. Replace mortar and fill open joints, holes, cracks and depressions with new mortar specified in Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING. Do not fill weep holes. Finish to match adjacent surfaces.

G. 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 application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Project Manager.
E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, 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 Project Manager, 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 prefinished items.
H. 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. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
   b. Transparent finishes as specified under Transparent Finishes on Wood except Floors.

F. Metals:

1. Steel and iron: 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), MPI 135 (Non-Cementitious Galvanized Primer).

G. Gypsum Board:

1. Surfaces scheduled to have MPI 52 (Interior Latex, MPI Gloss Level 3 (LE)) MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE) respectively.
2. Primer: MPI 50(Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) in shower and bathrooms.
3. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 98 (High Build Epoxy Coating) finish.

H. Concrete Masonry Units except glazed or integrally colored and decorative units:

1. MPI 4 (Block Filler) on interior surfaces.
2. Prime exterior surface as specified for exterior finishes.

3.6 EXTERIOR FINISHES

A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Steel and Ferrous Metal:

1. Two coats of MPI 94 (Exterior Alkyd, Semi-Gloss (EO)) on exposed surfaces, except on surfaces over 94 degrees C (200 degrees F).

3.7 INTERIOR FINISHES

A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
   b. Two coats of MPI 48 (Interior Alkyd Gloss (AK).

C. Gypsum Board:
1. One coat of MPI 45 (Interior Primer Sealer), MPI 46 (Interior Enamel Undercoat), plus one coat of MPI 139 (Interior High Performance Latex, MPI Gloss level 3 (LL).

D. 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).

E. 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. 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 31 (Polyurethane, Moisture Cured, Clear Gloss (PV).

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).

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 Section 09 06 00, SCHEDULE FOR FINISHES.

B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.

C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.10 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 in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified under paragraph H, colors.

C. Paint various systems specified in Division 02 – EXISTING CONDITIONS, Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY.

D. Paint after tests have been completed.

E. Omit prime coat from factory prime-coated items.

F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.

G. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.

H. Color:

1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
   a. White .....Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
   b. Gray: .....Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
   c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
   d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
   e. Federal Safety Orange: .Entire lengths of electrical conduits containing feeders 600 volts or more.
   f. Color to match brickwork sheet metal covering on breeching outside of exterior wall of boiler house.

I. Apply paint systems on properly prepared and primed surface as follows:

1. Exterior Locations:
   a. Apply two coats of MPI 94 (Exterior Alkyd, Semi-gloss (EO) to the following ferrous metal items:
      Vent and exhaust pipes with temperatures under

200 degrees F, roof drains, fire hydrants, post indicators, yard hydrants, exposed piping and similar items.

b. Apply two coats of MPI 11 (Exterior Latex, Semi Gloss (AE) to the following metal items:
Galvanized and zinc-copper alloy metal.

c. Apply one coat of MPI 22 (High Heat Resistant Coating (HR)), 1200 degrees F to incinerator stacks, boiler stacks, and engine generator exhaust.

2. Interior Locations:

a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) to following items:

1) Metal under 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. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 200 degrees F of following items:

1) Steam line flanges, bare pipe, fittings, valves, hangers and supports over 200 degrees F.

c. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 94 (Exterior Alkyd, Semi-gloss (EO) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

3. Other exposed locations:

a. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 10 (Exterior Latex, Flat (AE).

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 existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.

2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.

3. Painting of ferrous metal and galvanized metal.

4. Identity painting and safety painting.

B. Building and Structural Work not Painted:

1. Prefinished items:
   a. Casework, doors, 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 elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings except as otherwise specified.
   b. Inside walls or other spaces behind access doors or panels.
   c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
   a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
   b. Tracks for overhead or coiling doors, shutters, and grilles.
5. Labels:
   a. Code required label, such as Underwriters Laboratories Inc., Inchcape Testing Services, Inc., or Factory Mutual Research Corporation.
   b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
   a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
   b. Gas Storage Racks.
   c. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Face brick.
11. Structural steel encased in concrete, masonry, or other enclosure.

12. Structural steel to receive sprayed-on fire proofing.
13. Ceilings, walls, columns in interstitial spaces.
14. Ceilings, walls, and columns in pipe basements.

3.12 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 40 feet apart on straight runs of piping. Identification next to plumbing fixtures is not required.
   3. Locate Legends clearly visible from operating position.
   4. Use arrow to indicate direction of flow.
   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 - 60 psig and above.
      b. Medium Pressure - 15 to 59 psig.
      c. Low Pressure - 14 psig and below.
      d. Add Fuel oil grade numbers.
   6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off	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 Recirculating		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

7. Electrical Conduits containing feeders over 600 volts, paint legends using 2 inch high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 20 foot intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000
8. See Sections for methods of identification, legends, and abbreviations of the following:
   a. Regular compressed air lines: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
   b. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
   c. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS / Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS / Section 28 05 33, RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY.

B. 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 4 inches high, locate 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.

3.13 PROTECTION CLEAN UP, AND TOUCH-UP

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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Division 10

Specialties

Division 10

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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 may be either factory or field assembled.

1.2 RELATED WORK

Color of aluminum anodic coating markerboard writing surface: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 QUALITY ASSURANCE

Boards shall be the products of one manufacturer.

1.4 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, six by six inches, each color, mounted on backing.
2. Integrally colored anodized aluminum, six inch length.
3. Each accessory (after approval, may be used in the work).

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 National Standards (ANSI):

Z97.1-09.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-08.....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(R2009).....Nonmetallic Gasket Materials

D. Composite Panel Association (CPA):
A208.1-09.....Particleboard
A135.4-04.....Basic Hardboard

E. Porcelain Enamel Institute (PEI)
1001-11.....Architectural Porcelain Enamel

PART 2 - PRODUCTS

2.1 CHALKBOARD AND MARKERBOARD

A. Markerboards shall consist of a writing surface, snap on aluminum frame, chalk trough, mullions, display rail and accessories, grounds and other items specified and shown.

2.2 FABRICATION

A. Materials:
1. Aluminum, extruded: ASTM B221.
2. Backing: Hardboard, AHBA A135.4 or particleboard, CPA A208.1.

B. Components:
1. Writing Surface: Factory assembly consisting of face sheet of 24 gauge sheet steel with porcelain enamel board texture finish conforming to PEI 1001, laminated to a hardboard or particleboard backing, 3/8 to 1/2-inch thick, and a 0.005-inch thick aluminum foil back sheet laminated to back-face.
2. Frames (Trim): Extruded aluminum, 0.060-inch thick, snap-on type, approximate face width 1-3/4 inch, depth and configuration as required to return to wall and engage clips.
3. Trough: Extruded aluminum, 0.092-inch thick, not less than 3-inch projection from writing surface with grooved top surface, closed ends and return to wall surface at underside. Design to be snap-on type with concealed fasteners.
4. Accessories: Fabricate from aluminum with holders from spring steel. Design to suit display rail. Furnish accessories as follows:

Accessory Type	Lineal feet of rail per accessory
Combination map hook and paper holder.	24 inches

5. Mullions: Snap-on type, same material and face width as frames, designed to finish flush with frame.
6. Grounds: Continuous zinc-coated (galvanized) steel or extruded aluminum members designed to support the board writing surface and clips for snap-on frames, map rail and chalk tray.

7. Clips: Manufacturer's standard as required to support frame, mullions, display rail, and trough.

C. Boards 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).

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 MARKERBOARD

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 12 inches on center. Space clips 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 11 23
TACKBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies tackboards (bulletin boards).

B. Boards may be either factory or field assembled.

1.2 RELATED WORK

Color of aluminum anodic coating tackboard: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 QUALITY ASSURANCE

Boards shall be the products of one manufacturer.

1.4 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. Bulletin board.

D. Samples:

1. Tackboard, six by six inches, each color, mounted on backing.
2. Integrally colored anodized aluminum, six inch length.
3. Cork filled map rail, six inch length.
4. Each accessory (after approval, may be used in the work).

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. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual
AMP 501.....Finishes for Aluminum

C. American National Standards Institute(ANSI):

Z97.1-09.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-08.....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(R2009).....Nonmetallic Gasket Materials

E. Composite Panel Association (CPA):

A208.1-09.....Particleboard

A135.4-04.....Basic Hardboard

PART 2 - PRODUCTS

2.1 BULLETIN BOARD

Bulletin board shall consist of a tackboard, snap on aluminum frame, grounds and other items specified and shown.

2.2 FABRICATION

A. Materials:

1. Aluminum, extruded: ASTM B221.
2. Cork: ASTM F104, Type II, mildew resistant, Class 2.
3. Backing: Hardboard, AHBA A135.4 or particleboard, CPA A208.1.

B. Components:

1. Tackboard: Cork face, 1/4-inch thick factory laminated to a hardboard or particleboard backing.
2. Frames (Trim): Extruded aluminum, 0.060-inch thick, snap-on type, approximate face width 1-3/4 inch, depth and configuration as required to return to wall and engage clips.
3. Display Rail: Snap-on type, same materials as frames, approximate face width one inch with 1/4-inch thick cork insert.
4. Mullions: Snap-on type, same material and face width as frames, designed to finish flush with frame.
5. Grounds: Continuous zinc-coated (galvanized) steel or extruded aluminum members designed to support the tackboard and clips for snap-on frames, and map rail
6. Clips: Manufacturer's standard as required to support frame, mullions, and display rail,

C. Bulletin boards 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).

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 BULLETIN BOARD:

A. (Except glass door bulletin boards):

1. Mount bulletin boards with adhesive and blocking pads spaced 16 inches on center each way.
2. Grounds designed to receive clips for snap-on trim shall be continuous and be secured 12 inches on center. Space clips 12 inches on center.
3. 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 exterior wall mounted illuminated medical center identification signs and building identification signs.

1.2 RELATED WORK

A. Electrical: Related Electrical Specification Sections.

1.3 MANUFACTURER'S QUALIFICATIONS

A. Sign manufacturer shall provide evidence that they regularly and presently manufactures 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 00, 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 Project Manager, other returned to Contractor.

1. Sign Panel, 8 inches x 10 inches, with letters.
2. Color samples of each color, 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. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes. Sign location plan, showing location, type and total number of signs required.

E. Full size layout patterns for dimensional letters.

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 COLORS AND FINISHES:

A. As selected from manufacturer’s standard colors.

PART 2 - PRODUCTS

2.1 GENERAL

A. Signs of type, size and design shown on the drawings and as specified.

B. Signs complete with lettering, framing and related components for a complete installation.

C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

D. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Project Manager to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.

E. 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.

E. Electrical Signs:

1. General: Furnish and install all lighting, electrical components, fixtures and lamps ready for use in accordance with the sign type drawings, details and specifications.
2. Refer to Electrical Specifications Section, Division 26, ELECTRICAL, to verify line voltages for sign locations that require electrical signs.
3. Quality Control: Installed electrical components and sign installations are to bear the label and certification of Underwriter’s Laboratories, Inc., and are to comply with National Electrical Code as well as applicable federal, state and local codes for installation techniques, fabrication methods and general product safety.
4. Ballast and Lighting Fixtures: See Electrical Specifications.

2.3 SIGN STANDARDS

A. Topography:

1. Type Style: Helvetica Medium and Helvetica Medium Condensed. Initial caps or all caps as indicated in signage elevations.
2. Letter spacing: See VA graphic standards.

B. Colors and Finishes: As selected from manufacturer’s standard colors.

2.4 SIGN TYPES

A. General:

1. The sign system is comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.

B. IN indicates a component construction based sign.

1. The exterior sign system shall be comprised of sign type families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.
2. EI designation indicates exterior internally illuminated sign.
3. EN designation indicates exterior non-illuminated sign.

C. Interchangeable Component System:
   1. Sign Type Families: 06, 08 and 09.
D. Sign Type Family 08 and 09:
   1. All text and graphics are to be first surface silk-screened.
E. Sign Type Family 06:
   1. A11 text and graphics are to be first surface applied vinyl letters except for under sliding tile.
   2. Protect text, which is covered by sliding tile, so tile does not wear away letters.
F. Temporary Interior Signs:
   1. Fabricated from 50 kg (110 pound) matte finished white paper cut to 100 mm (4 inch) wide by 300 mm (12 inch) long. Punched 3 mm (.125 inch) hole with edge of hole spaced 13 mm (.5 inch) in from edge and centered on 100 mm (4 inch) side. Reinforce hole on both sides with suitable material that prevents tie form pulling through hole. Ties are steel wire 0.3 mm (0.120 inch) thick attached to tag with twist leaving 150 mm (6 inch) long free ends.
   2. Mark architectural room number on sign, with broad felt marker in clearly legible numbers or letters that identify room, corridor or space as shown on floor plans.
   3. Install temporary signs to all rooms that have a room, corridor or space number. Attach to door frame, door knob or door pull.
      a. Doors that do not require signs are: corridor doors in corridor with same number, folding doors or partitions, toilet doors, bathroom doors within and between rooms, closet doors within rooms, communicating doors in partitions between rooms with corridor entrance doors.
      b. Replace and missing damaged or illegible signs.

2.5 FABRICATION

A. Design components to allow for expansion and contraction for a minimum material temperature range of 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 0.015 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 Project Manager & 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 Project Manager 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 Sign Location Plans.

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 TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cubicle curtain track (C.C.T.).

1.2 RELATED WORK

A. Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. 12 inch long piece of cubicle curtain track with carrier access and end stop.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

D. Manufacturer's Literature and Data:

1. Cubicle curtain track.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location. Store so as to not bend or warp the tracks.

C. Do not open packages until contents are needed for installation, unless verification inspection is required.

1.5 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(R2009).....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS

A. Suspended mounting:

1. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, 1 ½” x 3/8”, powder coated white finish.

2. Provide bent and straight sections as indicated on the drawings.

B. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon. Provide the "Grabber" curtain loading tool.

C. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Provide swivel clip with drop ceiling mounting plate.

2.2 FASTENERS

A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.

B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized (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.

2.3 FINISHES

A. Powder coat white finish.

2.4 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 16 feet without joints. Form corner bend on a 12 inch radius.

C. Provide 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 to form a rigid installation.

C. Anchor surface mounted curtain tracks directly to blocking mounted above acoustical ceilings with suitable fasteners, spaced approximately 24 inches on center.

D. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 1/8-inch diameter fastenings or concealed clips spaced not more than three feet on center.

E. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.

F. 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 22 13
WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers steel mesh partitions complete with doors and hardware.

1.2 RELATED WORK

Lock cylinders keyed to system: Section 08 71 00, DOOR HARDWARE.

1.3 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 also.

B. American Society for Testing and Materials (ASTM):
A36/36M-08.....Carbon Structural Steel

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Mesh partitions, showing design, construction and materials.

C. Provide layout drawings with detailed erection drawings and specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Woven Wire: 1-1/2 inch diamond mesh No. 10 gage 0.1345 inch diameter uncoated steel crimped and woven.

B. Steel Shapes, Plates and Bars: ASTM A36/36M.
   1. Vertical Channel: 1-1/4 x 5/8 x 1/8 inch.
   2. Horizontal Channel: 1 x 1/2 x 1/8 inch.
   3. Center Reinforcement: Two, 1 x 1/2 inch turned in toe channels bolted.
   4. Corner Post: 1-3/4 x 1-3/4 x 1/8 inch angle.
   5. Top Reinforcement: 2-1/4 x 1 x 3/16 channel.
   6. Cast or forged adjustable floor shoes.

C. Doors:
   1. Hinged Door:
      a. Frame: 1-1/4 x 1/2 x 1/8 inch channel, with a midpoint channel.
      b. Hardware: 1-1/2 pair butts A 212 NRP 4 inch. Pick proof mortise type lock, key operated outside, recessed knob inside (see Hardware Section for lock cylinder).

c. Miscellaneous: Provide sheet metal baffle at lock, continuous angle stop and flat bar closures.

2.2 FABRICATION

A. Woven wire clinched to frame, mortise and tendon joints. Frame units shall be maximum 5 feet wide.

B. Rivet hardware to doors and frames. Bolt sliding door carriers to door.

C. Finish: Steel shall be phosphate coated and shall have one coat of baked enamel. Color shall be manufacturers standard gray. Do not paint shelves.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Erect the partition in accordance with the manufacturers detailed erection drawings.

B. Secure top reinforcing channels with 1/4-inch "U" bolts, 2 feet 4 inches on center.

C. Secure vertical posts with 1/4 inch bolts 12 to 15 inches on center, and anchor verticals at walls to wall 15 inches on center, shim as required.

D. Provide floor shoes at each post and each corner, adjust to level, anchor to floor with two anchors for each shoe.

3.2 ACCEPTANCE

A. Repair or replace damaged parts, touch-up abraded paint with matching paint.

B. Partitions shall be level and firm. Adjust hardware to operate smoothly and latch securely.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies wall guards (crash rails or bumper guards), handrail/wall guard combinations, corner guards and high impact wall covering.

1.2 RELATED WORK

A. Structural steel corner guards: Section 05 50 00, METAL FABRICATIONS.

B. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.

C. Color and texture of aluminum and resilient material: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Handrail/Wall Guard Combinations.
2. Wall Guards.
3. Corner Guards.
4. 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 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(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
D256-06.....Impact Resistance of Plastics
D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
E84-09.....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):
80-10.....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.

C. Resilient Material:

1. Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements:
   a. Minimum impact resistance of 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: Surface mounted type of 1-1/4 inch radius formed to profile shown.

1. Snap-on corner guard formed from resilient material, minimum 0.078-inch thick, free floating on a continuous 0.063-inch thick extruded aluminum retainer. 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.

B. Stainless Steel Corner Guards: Fabricate of 0.0625-inch thick stainless steel. Form guards of dimensions and to contour shown.

2.3 WALL GUARDS AND HANDRAILS

A. Resilient Wall Guards and Handrails:
1. Handrail/Wall Guard Combination: Snap-on covers of resilient material, minimum 0.078-inch thick, shall be free-floated on a continuous, extruded aluminum retainer, minimum 0.072-inch thick, anchored to wall at maximum 30 inches on center. Provide handrail configuration with 1-1/2-inch wide gripping diameter extending 3-inches from wall.
2. Wall Guards (Crash Rails) and Bed Locators: Snap-on covers of resilient material, minimum 0.110-inch thick, shall be free-floated over two-inch wide aluminum retainer clips, minimum 0.090-inch thick, anchored to wall at maximum 24 inches on center, supporting a continuous aluminum retainer, minimum 0.062-inch thick; or, shall be free-floated over a continuous extruded aluminum retainer, minimum 0.090-inch thick anchored to wall at maximum 24 inches on center.
3. Provide handrails and 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 handrails and wall guards (crash rails). Screw or bolt closure caps to aluminum retainer.

2.4 HIGH IMPACT WALL COVERING

A. Fabricate from vinyl acrylic or polyvinyl chloride resilient material minimum 0.06 inch thick designed specially for interior use.

B. Coordinate with guard rail and handrail protection material and supplier for proper fit, installation and color.

C. Provide adhesive as recommended by the wall covering manufacturer.

2.5 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.

B. Where type, size, spacing or method of fastening is not shown or specified, submit shop drawings showing proposed installation details.

2.6 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 thick2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

C. Stainless Steel: NAAMM finish Number 4.

D. Resilient Material: Embossed texture and color in accordance with SAE J 1545 and as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - INSTALLATION

3.1 RESILIENT CORNER GUARDS

A. Install corner guards on walls in accordance with manufacturer's instructions.

3.2 STAINLESS STEEL CORNER 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. Coat back surfaces of corner guards, where shown, with a non-flammable, sound deadening material. Corner guards shall overlap finish plaster surfaces.

1. Anchor corner guards to existing walls with 1/4-inch oval head stainless steel countersunk expansion or toggle bolts

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 HANDRAIL-WALL GUARD COMBINATIONS AND RESILIENT WALL GUARDS (CRASH RAIL)

A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions.

3.4 STAINLESS STEEL WALL GUARDS

A. Space brackets at not more than three feet on centers and anchor to the wall in accordance with manufacturer's installation instructions.

3.5 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 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies manufactured items usually used in dressing rooms, toilets and at sinks in related spaces.

B. Items Specified:

1. Grab Bars.
2. Clothes hooks, robe or coat.
3. Metal framed mirror.
4. Specimen pass-thru cabinet.
5. Mop racks.
6. Stainless steel shelves.

1.2 RELATED WORK

A. Color of finishes: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each product specified.
2. Metal framed mirrors, showing shelf where required, fillers, and design and installation of units when installed on ceramic tile wainscots and offset surfaces.
3. Grab bars, showing design and each different type of anchorage.
4. Show material and finish, size of members, and details of construction, installation and anchorage of mop racks.

C. Manufacturer's Literature and Data:

1. All accessories specified.
2. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.
3. Mop racks.

D. Manufacturer's Certificates:

1. Anodized finish as specified.

1.4 QUALITY ASSURANCE

A. Each 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 accessory type shall be the same and be made by the same manufacturer.

C. Each accessory shall be assembled 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 PACKAGING AND DELIVERY

A. Pack accessories individually to protect finish.

B. Deliver accessories to the project only when installation work in rooms is ready to receive them.

C. Deliver inserts and rough-in frames to site at appropriate time for building-in.

D. Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

1.6 STORAGE

A. Store products in weathertight and dry storage facility.

B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

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):

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

A176-99(R2009).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A312/A312M-09.....Seamless and Welded Austenitic Stainless Steel Pipes

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-03(R2009).....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C1036-06.....Flat Glass

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

D635-10.....Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position

F446-85(R2009).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

D3453-07.....Flexible Cellular Materials - Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications

D3690-02(R2009).....Vinyl-Coated and Urethane-Coated Upholstery Fabrics

C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

D. American Welding Society (AWS):
D10.4-86 (R2000).....Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

E. Federal Specifications (Fed. Specs.):
A-A-3002.....Mirrors, Glass
FF-S-107C (2).....Screw, Tapping and Drive
FF-S-107C.....Screw, Tapping and Drive.
WW-P-541E(1).....Plumbing Fixtures (Accessories, Land Use) Detail Specification

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B221, alloy 6063-T5 and alloy 6463-T5.

B. Stainless Steel:
1. Plate or sheet: ASTM A167, Type 302, 304, or 304L, except ASTM A176 where Type 430 is specified, 0.0299-inch thick unless otherwise specified.
2. Tube: ASTM A269, Alloy Type 302, 304, or 304L.

C. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.

D. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.

E. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.

F. Glass:
1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

G. Foam Rubber: ASTM D3453, Grade BD, Type 2.

H. Vinyl Covering: ASTM D3690, Vinyl coated fabric, Class A.

I. Plywood: PS1, Grade CD.

2.2 FASTENERS

A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.

B. Concealed Fasteners: Steel, hot-dip galvanized (except in high moisture areas such as showers or bath tubs use stainless steel).

C. Toggle Bolts: For use in hollow masonry or frame construction.

D. Hex bolts: For through bolting on thin panels.

E. Expansion Shields: Lead or plastic as recommended by accessory manufacturer for component and substrate for use in solid masonry or concrete.

F. Screws:

1. ASME B18.6.4.
2. Fed Spec. FF-S-107, Stainless steel Type A.

G. Adhesive: As recommended by manufacturer for products to be joined.

2.3 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

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

C. AA-M32 Mechanical finish, medium satin.

1. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
2. Stainless Steel: NAAMM AMP 503, finish number 4.

2.4 FABRICATION - GENERAL

A. Welding, AWS D10.4.

B. Grind dress, and finish welded joints to match finish of adjacent surface.

C. Form exposed surfaces from one sheet of stock, free of joints.

D. Provide steel anchors and components required for secure installation.

E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.

F. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.

G. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.

H. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.

I. Key items alike.

J. Provide templates and rough-in measurements as required.

K. Round and deburr edges of sheets to remove sharp edges.

2.5 GRAB BARS

A. Fed. Spec WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and ASTM F446.

B. Fabricate of stainless steel:

1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.

C. Concealed mount, except grab bars mounted at toilet partitions.

D. Bars:

1. Fabricate from 1-1/2 inch outside diameter tubing.
   a. Stainless steel, minimum 0.0478 inch thick.
2. Fabricate in one continuous piece with ends turned toward walls, except where grab bars are shown continuous around three sides of showers, bars may be fabricated in two sections, with concealed slip joint between.
3. Continuous weld intermediate support to the grab bar.

E. Flange for Concealed Mounting:

1. Minimum of 0.1046 inch thick, approximately 3 inch diameter by 1/2 inch deep, with provisions for not less than three set screws for securing flange to back plate.
2. Insert grab bar through center of the flange and continuously weld perimeter of grab bar flush to back side of flange.

F. Flange for Exposed Mounting:

1. Minimum 3/16 inch thick, approximately 3 inch diameter.
2. Insert grab bar through flange and continuously weld perimeter of grab bar flush to backside of flange.

G. Back Plates:

1. Minimum 0.1046 inch thick metal.
2. Fabricate in one piece, approximately 1/4 inch deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.
3. Furnish spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on solid polymer toilet partitions.

2.6 CLOTHES HOOKS-ROBE OR COAT

A. Fabricate hook units either of chromium plated brass with a satin finish, or stainless steel, using 1/4 inch minimum thick stock, with edges and corners rounded smooth to the thickness of the metal, or 1/8 inch minimum radius.

B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to the wall flange, provided with concealed fastenings.

2.7 METAL FRAMED MIRRORS

A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 302 or 304.

B. Mirror Glass:

1. Minimum 1/4 inch thick.
2. Set mirror in a protective vinyl glazing tape.

C. Frames:

1. Channel or angle shaped section with face of frame not less than 3/8 inch wide. Fabricate with square corners.
2. Use either 0.0359 inch thick stainless steel, chrome finished steel, or extruded aluminum, with clear anodized finish 0.4 mils thick.
3. Filler:
   a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface.
   b. Fabricate fillers from same material and finish as the mirror frame, contoured to conceal the void behind the mirror at sides and top.

D. Back Plate:

1. Fabricate backplate for concealed wall hanging of either zinc-coated, or cadmium plated 0.036 inch thick sheet steel, die cut to fit face of mirror frame, and furnish with theft resistant concealed wall fastenings.
2. Use set screw type theft resistant concealed fastening system for mounting mirrors.

E. Mounting Bracket:

1. Designed to support mirror tight to wall.
2. Designed to retain mirror with concealed set screw fastenings.

2.8 Specimen Pass-Through Cabinet

A. Basis-of-Design Product: Bobrick B-505.

B. Description: With self-closing doors on both sides, lock that prevents doors from both being opened at the same time, and removable stainless-steel tray.

C. Nominal Wall Opening: 12 by 11-1/4 inches, width times height.

D. Material and Finish: Stainless steel, No. 4 finish (satin).

2.9 MOP RACKS

A. Minimum 40 inches long with five holders.

B. Clamps:
   1. Minimum of 0.050-inch thick stainless steel bracket retaining channel with a hard rubber serrated cam; pivot mounted to channel.
   2. Clamps to hold handles from 1/2-inch minimum to 1-1/4 inch maximum diameter.
C. Support:
   1. Minimum of 0.0375 inch thick stainless steel hat shape channel to hold clamps away from wall as shown.
   2. Drill wall flange for 1/8 inch fasteners above and below clamp locations.
D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.
E. Finish on stainless Steel: AMP 503-No. 4.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before starting work notify Project Engineer in writing of any conflicts detrimental to installation or operation of units.
B. Verify with the Project Engineer the exact location of accessories.

3.2 INSTALLATION

A. 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.
B. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.
C. Install accessories plumb and level and securely anchor to substrate.
D. Install accessories in a manner that will permit the accessory to function as designed and allow for servicing as required without hampering or hindering the performance of other devices.
E. Position and install dispensers, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance as needed.
F. Align mirrors, dispensers and other accessories even and level, when installed in battery.
G. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 SCHEDULE OF ACCESSORIES

Item	Exam Rm,Staff Lounge/Nourish Sinks	Soiled Holding Hskg	Public, Patient & Staff Toilets
36” Grab Bars:			12
42” Grab Bars:			12
36” X 36” Two Wall HD Grab Bar:			1
24” x 36” Glass Mirror:			12
Surface Mounted Toilet Paper Dispenser:			12 (Furn. by VA)
Surface Mounted Paper Towel Dispenser:	37 (Furn. by VA)	4 (Furn. By VA)	12(Furn. by VA)
Coat/ Clothes Hooks:			
Sharps:	37 (Furn. by VA)		12(Furn. by VA)
Wall Mounted Soap Dispenser:	41 (Furn. by VA)		12(Furn. by VA)
Shelf with Mop and Broom Holder:		3	
Wire Rack Glove Box Holder	37 (Furn. by VA)		

3.4 CLEANING

A. After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

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SECTION 10 44 13

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers fire extinguisher cabinets and mounting brackets.

1.2 RELATED WORK

A. Field Painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

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

B. American Society of Testing and Materials (ASTM):
D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINETS

A. Recessed type with flat trim of size and design shown.

B. Semi-recessed type with rolled edge trim, 4 inch backbend depth.

C. Surface mounted type.

2.2 FABRICATION

A. Form body of cabinet from 0.0359 inch thick sheet steel.

B. Fabricate door and trim from 0.0478 inch thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 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 mounting bracket for fire extinguisher is 48 inches above finished floor.

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SECTION 10 53 00

CANOPIES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Work in this section includes furnishing and installation of roll-formed aluminum overhead hanger rod style canopies as manufactured by Mapes Industries Inc.

B. Related Items and Considerations

1. Flashing of various designs may be required. Generic flashing supplied by Mapes. Specialty flashing to be supplied by installer.
2. Determine wall construction, make-up and thickness.
3. Ensure adequate wall condition to carry canopy loads where required.
4. Consider water drainage away from canopy where necessary.
5. Any necessary removal or relocation of existing structures, obstructions or materials.

C. SUBMITTALS

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Color Samples.

1.2 QUALITY ASSURANCE

A. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc. Lincoln, Nebraska 1-888-273-1132.

1.3 FIELD MEASUREMENT

A. Confirm dimensions prior to preparation of shop drawings when possible.

B. If requested, supply manufacturer s standard literature and specifications for canopies.

C. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

1.4 PERFORMANCE REQUIREMENTS

A. Canopy must conform to local building codes.

B. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

1.5 DELIVER, STORAGE, HANDLING

A. Deliver and store all canopy components in protected areas.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Mapes Canopies
Lincoln, Nebraska
Phone: 1-888-273-1132.
Fax: 1-877-455-6572.

B. Pre-Approved Equal.

2.2 MATERIALS

A. Decking shall consist of an interlocking roll-form 2 1/2 W style pan (.032" aluminum).

B. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures.

C. Hanger rods and attachment hardware shall be powder coated.

D. Fascia shall be standard 8" extruded JM style.

2.3 FINISHES

A. Finish type shall be selected by the architect from Manufacturer’s full color range.

2.4 FABRICATION

A. All Mapes canopies are shipped in preassembled sections for ease of installation.

B. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.

C. Decking shall be designed with interlocking roll-formed aluminum members.

D. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to Rear Gutter.

E. Provide roof leader downspout to match.

PART 3 – EXECUTION

3.1 INSPECTION

A. Confirm that surrounding area is ready for the canopy installation.

B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.

C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed

3.2 INSTALLATION

A. Installation shall be in strict accordance with manufacturer s shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.3 AFTER INSTALLATION

A. After installation, entire system shall be left in a clean condition.

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Division 12

Furnishings

Division 12

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SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies 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. This section also includes acrylic solid surface countertops and laminated plastic countertops for wood casework.

1.2 RELATED WORK

A. Color and Finish of Plastic Laminate: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Lavatories and Plumbing in Casework: Section 22 40 00, PLUMBING FIXTURES.

1.3 MANUFACTURER'S QUALIFICATIONS

A. 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:
   1. Sinks, trim and fittings.
   2. Locks for doors and drawers
   3. 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.

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 (R2009).....Stainless and Heat-Resisting chromium-Nickel Steel Plate, Sheet and Strip
A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
C1036-06.....Flat Glass

C. Composite Panel Association (CPA):
A208.1-09.....Particleboard

D. U.S. Department of Commerce Product Standards (Prod. Std):
PS1-95.....Construction and Industrial Plywood

E. Hardwood, Plywood and Veneer Association (HPVA):
HP-1-09.....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
LD3.1-95.....Performance, Application Fabrication and Installations of High-Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN

A. Casework fabricated by Amcase and/or Neocase.

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, LD3.1 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

A. Prod. Std. PS1, five ply construction from 1/2 inch to 1-1/8 inch thickness, and seven ply for 1 1/4 inch thickness.

2.4 PARTICLEBOARD

A. CPA A208.1, Type 1, Grade 1-M-3.

2.5 SOLID POLYMER MATERIAL

A. Filled Methyl Methacrylic Polymer.

B. Performance properties required:

Property	Result	Test
Elongation	0.3% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785
Gloss (60^0 Gordon)	5-20	NEMA LD3.1
Color stability	No change	NEMA LD3 except 200 hour
Abrasion resistance	No loss of pattern Max wear depth 0.0762 mm (0.003 in) - 10000 cycles	NEMA LD3
Water absorption weight (5 max)	24 hours 0.9	ASTM D-570
Izod impact	14 N·m/m (0.25 ft-lb/in)	ASTM D256 (Method A)
Impact resistance	No fracture	NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball
Boiling water surface resistance	No visible change	NEMA LD3
High temperature resistance	Slight surface dulling	NEMA LD3

C. Cast into sheet form and bowl form.

D. Color throughout with subtle veining through thickness.

E. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.

F. Bio-based products will be preferred.

2.6 RUBBER BASE

A. Straight (for carpet), cove (for resilient floor); 4 inch high, 1/8 inch thick, flexible to conform to irregularities in walls, partitions and floors.

2.7 PLUMBING FIXTURES

A. ASME A112.18.1, except die-cast zinc-alloy material is not acceptable.

2.8 SHEET STEEL

A. ASTM A1008.

2.9 STAINLESS STEEL

A. ASTM A167, with No. 4 finish.

2.10 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 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 36 inches and more in height shall have three hinges and doors less than 36 inches in height shall have two hinges. Each door shall close against two rubber bumpers.
   2. Hinges: Fabricate hinges with minimum 0.072 inch thick chromium plated steel leaves, and with minimum 0.139 inch diameter stainless steel pin. Hinges shall be five knuckle design with 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 48 inches high and under, and two for doors over 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. 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.

2.11 FABRICATION

A. Casework shall be of the flush overlay design and, except as otherwise specified, be of premium grade construction and of component thickness in conformance with AWI Quality Standards.

B. Fabricate casework of plastic laminated covered plywood or particleboard as follows:
1. Where shown, doors, drawers, shelves and all semi-concealed surfaces shall be plastic laminated.

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 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. Plastic Laminate Countertops:
1. Countertops shall be plastic laminate factory glued to either a plywood (PS1), or particleboard (CPA A208.1) core.
2. Countertops shall be 1-1/4 inches) thick.
3. Splashbacks shall be finished 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 with plastic.

G. Methyl Methacrylic Polymer Countertops including integral sinks:
1. Fabricate countertop of methyl methacrylic polymer cast sheet, 3/4 inch thick.
2. Fabricate back splash and end splash to height shown.
3. Fabricate skirt to depth shown.
4. Fabricate with marine edge where sinks occur.
5. Fabricate in one piece for full length from corner to corner up to 12 feet.
6. Provide solid surface tops with integral sink bowls.
7. Join pieces with adhesive sealant.
8. Cut out countertop for lavatories, plumbing trim.
9. Provide concealed fasteners and epoxy cement for anchorage of sinks to countertop.

H. Sink bowls for plastic laminate countertops:
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.

I. 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 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.

J. Faucets:
   1. ASME A112.18.1 Type I, compression type, splashback mounted, chromium plated brass, having two valves and with 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.

K. 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.

L. Traps: Cast brass.

M. Support Members for Tops of Tables:
   1. Construct as detailed.
   2. Provide miscellaneous steel members and anchor as shown.

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 34 10

MODULAR FURNITURE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section includes:

1. Furnish all labor, materials, tools, equipment, design and installation services for modular furniture, including systems furniture, modular casework and accessories indicated on Drawings.
2. Fully coordinate work with all other trades.
3. Furnish and install miscellaneous items incidental to, or necessary for sound, secure, and complete installation.

B. Related Work:

1. Special and General Requirements, Divisions 0 and 1.
2. Mechanical Work: Divisions 22 and 23.
3. Electrical Work: Divisions 26, 27 and 28.

1.2 REFERENCES AND QUALITY ASSURANCE

A. References:

1. National Sanitation Foundation (NSF 30)
2. Building and Institutional Furniture Manufacturers Association (BIFMA)
3. National Electrical Code (FPA 70-1990).
4. Underwriter’s Laboratory (UL)
5. Electrical Testing Laboratory (ETL)

B. Design Criteria:

1. The intent of this specification is to provide quality and functional interior furnishings for the facility. These products should enable the health care facility to avoid product replacement cost and at the same time avoid product obsolescence. The interior furnishings must respect this intent in addition to providing maximum product integration and flexibility to accommodate changing medical technology. The products must have the inherent qualities of durability, aesthetic value, and safety while being most functional within the health care setting.
2. All products must adhere to infection control requirements.

C. Installer/Erector Qualifications:

1. Furnish proof of training completion and authorization for installation of systems indicated.
2. Provide on-site Project Manager throughout installation.

3. Provide list of at least three previous projects, giving names of projects, scope, and name and telephone number of individual at facility to contact.

1.3 SUBMITTALS

A. Shop drawings:
1. Provide complete shop and installation drawings, showing all dimensioning, details of construction and accessory items.
2. Indicate electrical, mechanical, and telecommunication entry locations.
3. Indicate required wall reinforcement and anchorages.
4. Provide listing of components not included in bid but required to operate system to Owner.

B. Product data:
1. Provide catalog and model numbers for all components.
2. Provide addresses and phone numbers of nearest stocking/service parts locations.

C. Samples:
1. Provide samples of finishes, including fabrics and colors.
2. Provide documentation related to Infection Control.

D. Project close-out data:
1. Operating and maintenance data.
a. Provide technical and operational instruction and user’s manuals for all components.
2. Warranties: As indicated in Section 1.6.
3. Location, contact name, phone number and website address of nearest service organization.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver all components to site in manufacturer’s clearly identified containers.

B. Package, deliver, receive, inspect and store in a secured space in a manner to prevent damage.

C. Time delivery to assure components are available at site when required for installation.

1.5 JOB CONDITIONS

A. Existing conditions:
1. Assure that walls scheduled to receive attachment of system components are adequately reinforced to accept installation of this work.
2. Assure that wall, floor, and ceiling work are finished.
3. Report deficiencies to Contractor for correction.

B. Sequencing:
   1. Sequence this work to allow work by Mechanical and Electrical Contractors to be performed without interference.
   2. Coordinate this work with other operations in same area to avoid conflicts.

1.6 WARRANTY

A. All warranties run from date of Substantial Completion.
B. Written warranty on entire system for period of one year.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable manufacturers:
   1. System Furniture: Herman Miller, Inc.
   2. Modular Casework: Amcase "Brand Name or Equal" (FAR 52.211-6 and VAAR 852.211-73).
B. Contact:
   Linda Rains
   Pigott, Inc.
   2345 Blairs Ferry Road NE, Suite G
   Cedar Rapids, IA 52402
   319.393.1031 Ext 344
   lrains@pigottnet.com
C. Substitutions: No substitutions permitted for this work per General Conditions 4.29.

2.2 MANUFACTURED PRODUCTS

A. Provide Action Office System and Ethospace System by Hermann Miller, Inc., and modular casework by Amcase, including required ancillary items and accessories indicated on Drawings.

2.3 FINISHES

A. Colors shall be selected from manufacturer's standard lines.
B. Finishes to meet need for infection control.
C. Components finished with chemical-resistant paint, must show not visible effect when tested in accordance to NSF-30.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect areas in which work is to be performed for acceptability to receive work.
B. Proceeding with work constitutes acceptance of existing conditions.

3.2 INSTALLATION

A. Manufacturer's authorized installation representatives shall be responsible for installation and project management.

B. Assemble and install all items in strict accord with manufacturer's printed instructions.

1. Anchor all fixed components firmly, square, level, plumb.

C. Horizontal support elements.

1. Install at heights indicated with all tops, shelves, and writing surfaces level within 1/8" across width.

D. Vertical support elements:

1. Install plumb, spaced as indicated on shop drawings.
2. Align slots to assure hanging units are level.

3.3 FIELD QUALITY CONTROL

A. Adjust components to assure proper alignment and operation.

B. Repair, if acceptable, or replace all damaged or improperly operating items.

3.4 CLEANING

A. Immediately after installation and adjustment, clean all surfaces to remove all marks, soil and foreign matter.

B. Just prior to Substantial Completion, recheck all components and perform all required additional cleaning.

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Division 13

Special Construction

Division 13

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SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. General

1. Pre-Framed Panel Pre-Engineered Metal Buildings, as that term is used in this Section, is intended to define a pre-engineered steel building system comprised of pre-framed modular roof and wall panel assemblies and accessories.
2. Pre-framed roof and wall panel are to consist of exterior ribbed steel sheeting, and pre-fabricated structural steel panel frame with optional rigid insulation and interior steel insulation liner.
3. Building systems that require field fastening exterior sheeting on an independently erected structural frame are not acceptable.
4. The pre-framed roof and wall panels when combined with a few angle accessories, form simple span roofs, roof diaphragm and shear walls.
5. The factory framed panels are fabricated from steel angles or a combination steel angle and channel frames. The sidewall panels support the simple span roof panels and resist lateral loads. The connected pre-framed wall panels act together to form shear walls to resist roof diaphragm loads.

B. Design Requirements

1. Building Configuration
   a. Roof slope shall be a minimum of 2:12 pitch single slope (shed roof) configuration.
   b. Panels shall be factory-assembled and delivered to the site in a ready-to-be-installed arrangement that do not require pre-setting of anchor bolts.
   c. The design of structural steel members shall comply with the provisions of the AISC Specification for Structural Steel Buildings, 2005.
   d. The pre-framed roof will be supported on two sides by factory assembled wall panels and on two sides by steel supports as shown on the contract documents. Connection to the steel supports is by the Pre-Engineered Metal Building supplier/engineer.

C. Performance Requirements

1. Design Loads

a. Dead Loads
   1) Self-weight of the structure.
   2) Collateral roof dead load of 5 psf uniformly distributed on main roof members (excluding roof sheeting and secondary support members).

b. Live Loads
   1) Minimum roof live load of 25 psf applied in accordance with the method prescribed in IBC 2009.

c. Snow Loads
   1) Ground Snow load of 25 psf applied in accordance with the method prescribed in IBC 2009.
   2) Importance Factor $I_S = 1.2$

d. Wind Loads
   1) Basic Wind Speed of 90 mph (3-second gust)with an Exposure factor of B applied in accordance with the method prescribed in IBC 2009.
   2) Importance Factor $I_W = 1.15$

e. Seismic Loads
   1) In accordance with in IBC 2009.
   2) $S_{ds} = .08$, $S_{d1} = .06$
   3) Importance Factor $I_E = 1.5$

f. Combination of Loads
   1) Combine the above listed loads in compliance with IBC 2009.

1.2 SUBMITTALS

A. Approval Drawings as Shop Drawings
   1. Building floor plan.
   2. Foundation plan & panel base section.
   3. Sheeting and trim color schedule.
   4. Elevations with location and description of all building accessories including but not limited to, doors, windows and ventilations items.
   5. Building cross-section.
   6. Door and Hardware schedule.
   7. Drawings stamped and signed by a structural engineer licensed to practice in the state of Iowa.
   8. Project specific structural calculations stamped and signed by a structural engineer licensed to practice in the state of Iowa.

B. Assembly Drawings

1. All information included on “Approved-Drawings”.
2. Material and parts lists, structural framing details, connections, and manufacturer's recommended installation procedures.
3. Tool List.
4. Detailed unloading instructions.
5. Pre-framed panel by panel Key Plan (Layflat Plan).
6. Details of all structural steel connections.
7. Details of all weatherizing flashing.
8. Schematics and pictures illustrating assembly procedures.
9. Installation instructions for all accessories.

C. Warranties
1. Manufacturer’s overall pre-framed pre-engineered metal building system warranty.
2. Manufacturer’s exterior wall/roof sheeting warranty.

D. Submit in accordance with manufacturer’s standard.

1.3 WARRANTY

A. Overall Systems
1. Guarantee overall pre-framed pre-engineered metal building system to be free from defects in material and workmanship for 12 months from date of receipt of material.

B. Exterior Wall/Roof Sheeting Painted
1. Guarantee wall/roof sheeting exterior paint film color finish by sheeting manufacturer for 40 years against crack, check, peel or loose adhesion.
2. Guarantee no excessive color change and chalking for 40 years. Color change shall not exceed 5 NBS units in accordance with ASTM D2244, and chalking shall not be less than rating of 8 in accordance with ASTM D4214.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Kelly Klosure Systems pre-framed panel pre-engineered metal building system manufactured by Kelly Group, Inc. of Fremont, Nebraska. / www.kellyklosure.com / inquire@kellyklosure.com / 800.228.7230

B. Pre-approved equal.

2.2 STRUCTURAL FRAMING

A. Primary Panel Frame Angles: Minimum L 2 x 2 x 1/8 ASTM A529-50

B. Braced Wall Panels Frame Verticals: Minimum L 3 x 2 x 3/16 ASTM A529-50 or as required per structural engineer analysis

C. Wall and Roof Panel Cross-Members (Horizontal Members): Minimum L 1.5 x 1.5 x 1/8 A36

D. Channel Shapes: Formed from 11 gauge Hot-Rolled ASTM A-1011 Sheets with 50,000 PSI Yield

E. Anchor Bolts: Anchor building to foundation with screw anchors/expansion/adhesive-type anchors sized to resist applied loadings while building is assembled over pre-installed foundations.

F. Connection Bolts:

1. ½" diameter and below: SAE J4269 Gr. 5, or ASTM A325
2. 5/8" diameter and larger: ASTM A325

G. Coatings

1. Standard Primer Coating:
   Apply Red Oxide Water Reducible Alkyd Primer with conventional air or airless spray systems. Apply to a clean surface free from mill scale, oil, dust and rust to ensure good adhesion. Apply to a dry film thickness of 1.0 to 2.0 mils. Primer will be free of all lead and chromate hazards. Primer is to exhibit good lift resistance, corrosion resistance and is to resist flash rusting. Primer is to sustain durability for a minimum of 150 hours with less than 3 mm creep from the scribe under ASTM B117. Primer will additionally exhibit a Class 5 adhesion rating under ASTM D3359.

2.3 EXTERIOR METAL SHEETING

A. General

1. Ribbed exterior face sheeting used to form pre-assembled pre-framed roof and wall panels shall be fabricated from Galvalume coated, primed and painted steel sheets in the thickness (gauge), yield strength (fy) and quality (grade) to satisfy the structural design loading requirements of Section 1.01 when configured into ribbed profile.
2. Exterior sheeting to be 26 gauge, 80,000 PSI Grade 'E' base metal rolled in a ¾" high ribbed profile.
3. Exterior sheeting to be factory fastened to the modular panel frame with exposed hex washer head screws. Screws to have a 1000 hour salt spray coating and include a 5/8" ESPN rubber washer. Screws to be painted to match the exterior finish color.

4. Sheeting closure, flashings, fascias, gutters, and trim shall be building manufacturer's standard, compatible with pre-framed wall and roof panels.

B. Pre-painted exterior metal sheeting

1. Base material shall be "Galvalume" to protect against undercutting corrosion through sacrificial behavior of zinc.
2. Pre-treat "Galvalume" coated steel sheets with chrome oxide to inhibit corrosion and promote adhesion. Apply a primer consisting of epoxy modified polyester to improve adhesion and flexibility. Apply topcoat consisting of 30% siliconize modified polyester (SMP) to minimize chalk and fade.
3. Coatings shall be factory applied and baked so the solvents are released and incinerated and the pigments are resins are left on the substrate.
4. Architect will select color(s) from manufacture's standard color chart.

2.4 FACTORY INSTALLED THERMAL INSULATION

A. Polyisocyanurate Foam Insulation

1. Rigid, closed, cell, HCFC free thermal insulation board composed of a polyisocyanurate foam core bonded to glass fiber reinforced aluminum foil facer on both sides of the board.
2. Accepted as a nonstructural insulation board by the International Building Code.
3. Classified as Type 1 Class 1 pursuant to ASTM C1289.
4. Qualified for use as exposed interior wall and/or ceiling insulation per IBC 2603.5.5 by meeting requirements of NFPA 285.
5. Flame Spread of 25 or less per ASTM E84.
6. Smoke Developed of 450 or less per ASTM E84.
7. The aluminum facer to be 1.5 mil on the exposed side and 0.3 mil on the opposite side.
8. Provide pre-framed roof panels with factory installed insulation with an R-value of 27.
9. Provide pre-framed wall panels with factory installed insulation with an R-value of 20.

2.5 ACCESSORIES

A. Personnel Doors, Windows, Frames and Hardware

1. Hollow Metal Doors

a. Doors, Windows, Frames and Hardware shall be purchased and installed per corresponding specifications sections.

b. Coordinate and provide steel framing required for door and window installation.

B. Gutters and Downspouts

1. Provided manufacturer's standard gutter and downspout accessories in the same finish as the wall and/or roof sheeting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals.

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