

**EMERGENCY DEPARTMENT  
RENOVATION AND EXPANSION  
BUILDING NUMBER ONE  
VA PROJECT NUMBER: 636A6-09-343**

**VOLUME ONE  
Divisions 00-14**

**VETERANS AFFAIRS  
CENTRAL IOWA HEALTH CARE SYSTEM  
DES MOINES DIVISION  
3600 30TH STREET  
DES MOINES, IOWA**

**TECHNICAL SPECIFICATIONS**

BBSAE Project Number: 01004

Bidding Set: June 5, 2012



**BROOKS BORG SKILES**  
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DES MOINES DIVISION  
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**VA PROJECT NUMBER: 636A6-09-116**

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**SECTION 01 00 00**  
**GENERAL REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- 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 Emergency Department Renovation and Expansion for the VA Central Iowa health Care System, located in Building #1 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 Brooks Borg Skiles Architecture Engineering, LLP, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. Before placement and installation of work subject to tests by testing laboratory, the Contractor shall notify the Resident Engineer and testing laboratory in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the Resident Engineer.
- 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 certified "competent person" (CP) (29 CFR 1926.20(b)(2)) will maintain a presence at the work site whenever the general or subcontractors are present.
- G. Training:
  - 1. All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training approved by Resident Engineer.
  - 2. General Contractor's superintendent shall have the 30-hour OSHA certified Construction Safety course and /or other relevant competency training.
  - 3. Submit training records of all such employees for approval before the start of work.

## 1.2 STATEMENT OF BID ITEM(S)

- A. ITEM I, GENERAL CONSTRUCTION: Construct approximately 7800 SF of a new one-story addition to house the Emergency Department and renovation of approximately 1670 SF of the existing Building No. 1. Work includes general construction, alterations, site work, utility systems, mechanical and electrical work, necessary removal of existing structures and construction, and certain other items in accordance with the Drawings and Specifications.
- B. ALTERNATE BID ITEMS: There are 3 Alternates in the project. See Section 01 23 00, ALTERNATES for full description.

## 1.3 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. See also Section 01 00 11 – MEDICAL CENTER REQUIREMENTS for additional security requirements.
- C. 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.
- D. Work Area Security:
  - 1. Contractor shall maintain the work area secure so that the public cannot enter the site unescorted.

## E. Key Control:

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

## F. 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.

## G. Motor Vehicle Restrictions

1. **Except for deliveries, the Contractor will be limited to the designated project staging area and the parking along Red Cross Drive, in legal zones.**
2. See Section 01 00 11 – Medical Center Requirements.

## 1.4 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 ..... Standard for Portable Fire Extinguishers
    - 30 ..... Flammable and Combustible Liquids Code
    - 51B..... Standard for Fire Prevention During Welding, Cutting and  
Other Hot Work
    - 70 ..... National Electrical Code
    - 241 ..... 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 Resident Engineer and Facility Safety Officer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions shall generally be of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.
  2. Install one-hour fire-rated temporary construction partitions where shown on drawing to maintain integrity of corridor smoke barriers 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.
  4. See also Section 01 00 11 – MEDICAL CENTER REQUIREMENTS for additional requirements regarding dust control.
- 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 Resident Engineer, facility Fire Chief, and facility Safety Officer.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Resident Engineer, facility Fire Chief, and facility Safety Officer.
- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
1. **Provide enclosure box to protect extinguisher. Paint box bright red or orange.**
  2. **Inspect extinguishers and enclosures monthly.**
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Coordinate with Resident Engineer and facility Safety Officer for modifications to sprinkler so as to maintain fire protection to all occupied portions of the building at all times.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS,

and coordinate with Resident Engineer, facility Fire Chief, and facility Safety Officer. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.

1. Interruption of the existing Fire Protection Systems solely for the Contractor's convenience will NOT be permitted.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Resident Engineer, facility Fire Chief, and facility Safety Officer.
- N. Hot Work: See Section 01 00 11 – MEDICAL CENTER REQUIREMENTS.
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Resident Engineer, facility Fire Chief, and facility Safety Officer.
- P. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.
- S. If required, submit documentation to the Resident Engineer that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

## **1.5 OPERATIONS AND STORAGE AREAS**

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written

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

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

**(FAR 52.236-10)**

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

1. See Construction Drawings for general phasing requirements:
  2. All Phasing shown on Drawings shall be confirmed by the Contractor with Resident Engineer before proceeding.
- I. Building No. 1 will be occupied during performance of work; but immediate areas of alterations will be vacated.
1. The public corridors in the occupied portions of the building must remain open at all times.
    - a. Provide temporary construction partitions between construction area and the public path.
    - b. Conduct demolition and construction within the public corridors during the overnight and weekend hours. Coordinate schedule with the Resident Engineer.
    - c. All occupied areas must be fully cleaned by the Contractor prior to re-commencement of hospital operations within those areas.
    - d. 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. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
- J. When portions of a building are 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. 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 Resident Engineer.
1. Revise fence locations during construction as necessitated by phasing of Work.
- L. 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 Resident Engineer.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Resident Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
  2. Contractor shall submit a request to interrupt any such services to Resident Engineer, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
  4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer.

5. In case of a contract construction emergency, service will be interrupted on approval of Resident Engineer. Such approval will be confirmed in writing as soon as practical.
  6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- M. 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.
1. Mark all capped and abandoned duct, conduits or pipes that are still connected to service with a permanent label indicating to what they are / were connected and whether they are still active.
- N. 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 work occurs on or near 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 Resident Engineer.
- O. Coordinate the work for this contract with other construction operations as directed by Resident Engineer. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

## **1.6 ALTERATIONS**

- A. Survey: Before any work affecting existing portions of the building is started, the Contractor shall make a thorough survey with the Resident Engineer 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 finishes and items not intended to be altered as a part of the Work.

2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, etc., required by drawings to be either reused or relocated, or both.
  3. Existing condition of paths to be used for movement of materials outside the dedicated work area.
  4. Shall note any discrepancies between drawings and existing conditions at site.
  5. 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 Resident Engineer.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Resident Engineer, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Resident Engineer together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration and other damage. In case of leaks, they shall be repaired immediately upon discovery.
    - a. Where equipment is used on the roof or new holes are cut or the Contractor is working at one location for more than a short time (one hour or less), provide a layer of minimum 1" thick rigid foam insulation topped with a layer of minimum 1/2 inch thick plywood as a walking and working surface for workmen and equipment.

- b. All roof work affecting existing roofing systems must be done according the requirements of the current holder of the roof warranty. Verify requirements.
- 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.

## **1.7 INFECTION PREVENTION MEASURES**

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Resident Engineer 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 RE 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 Resident Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
  2. Do not perform dust producing tasks within occupied areas without the approval of the Resident Engineer. For construction in any areas that will remain jointly occupied by the medical Center and Contractor's workers, the Contractor shall:
    - a. Provide dust proof barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust.
      - 1) Unless indicated otherwise or authorized by the Resident Engineer in writing, such barriers shall conform to the construction and fire-rating requirements indicated for temporary construction partitions under FIRE SAFETY article in the section.
      - 2) Barriers shall be sealed and made presentable on hospital occupied side.
      - 3) Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access.
      - 4) Maintain negative air pressure at all times.
    - b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.
    - c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
    - d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA

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

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

F. See Section 01 00 11 – MEDICAL CENTER REQUIREMENTS for additional requirements.

## 1.8 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
  - 1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that

remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.

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

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

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

#### **(FAR 52.236-9)**

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

- D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. A National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate medical center) office. The apparent low bidder, contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:
1. Designating areas for equipment maintenance and repair;
  2. Providing waste receptacles at convenient locations and provide regular collection of wastes;
  3. Locating equipment wash down areas on site, and provide appropriate control of wash-waters;
  4. Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
  5. Providing adequately maintained sanitary facilities.

#### **1.10 RESTORATION**

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc.,

of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).
- E. See Section 01 73 29 – CUTTING AND PATCHING for additional requirements.

#### **1.11 PHYSICAL DATA**

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

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

Geotechnical Services, Inc (GSI)  
10607 Aurora Avenue  
Urbandale, Iowa, 50322  
515-270 6542

**(FAR 52.236-4)**

- B. See Section 02 31 00, GEOTECHNICAL SERVICES and APPENDIX for more information.
- 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.

#### **1.12 PROFESSIONAL SURVEYING SERVICES**

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

### 1.13 LAYOUT OF WORK

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

**(FAR 52.236-17)**

- B. Establish and plainly mark center lines for each building and/or addition to each existing building and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such structure and/or addition, 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 Resident Engineer before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.
- D. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the Resident Engineer before any major items of concrete work are placed. In addition, furnish to the Resident Engineer certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.

1. Lines of each building and/or addition.
  2. Elevations of bottoms of footings and tops of floors of each building and/or addition.
  3. Lines and elevations of sewers and of all outside distribution systems.
  4. Lines and elevations of roads, streets and parking lots.
- E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to Resident Engineer.
- F. Upon completion of the work, the Contractor shall furnish the Resident Engineer, reproducible drawings at the scale of the contract drawings, showing the finished grade on the grid developed for constructing the work, including burial monuments and fifty foot stationing along new road centerlines. These drawings shall bear the seal of the registered land surveyor or registered civil engineer.
- G. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

#### **1.14 AS-BUILT DRAWINGS**

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

#### **1.15 USE OF ROADWAYS**

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

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

**1.17 USE OF EXISTING ELEVATORS**

- A. Limited use of existing building elevators is anticipated as follows:
  - 1. The freight elevator can be utilized but requires coordination between the contractor and the COR.
  - 2. The other building elevators in the facility are passenger elevators and shall be used as such. Use of these elevators will require express written consent by the COR.
  - 3. The existing one-stop elevator at the current SE building entrance (Room E1562) shall NOT be used for construction operations.

**1.18 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 Resident Engineer, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.
- B. Contractor may use existing toilet rooms within the building only if authorized in writing to do so by the Resident Engineer. Contractor shall use only those specific toilet rooms which are indicated in the authorization.
- C. If, at the option of the Resident Engineer, the Contractor is permitted to use existing toilet rooms within the building, the Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workmen. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

**1.19 AVAILABILITY AND USE OF UTILITY SERVICES**

- A. Electrical (For Construction and Testing): The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
  - 1. Obtain electricity by connecting to the Medical Center electrical distribution system. 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.

2. 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.
- B. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
1. If written permission is obtained from the Resident Engineer, heat may be obtained by connecting to Medical Center steam or hot water heating distribution system. See Drawings for nearby sources.
- C. 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 Resident Engineer's discretion) of use of water from Medical Center's system.

#### **1.20 NEW TELEPHONE EQUIPMENT**

- A. 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.

#### **1.21 TESTS**

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

Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a complex which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.

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

## **1.22 INSTRUCTIONS**

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

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

### **1.23 GOVERNMENT-FURNISHED PROPERTY**

- A. The Government shall deliver to the Contractor, the Government-furnished property shown on the drawings.
- B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at the Medical Center.
- C. 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.

#### **1.24 RELOCATED EQUIPMENT ITEMS**

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

#### **1.25 CONSTRUCTION SIGN**

- A. Provide a Construction Sign where directed by the Resident Engineer. 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 Resident Engineer.

**1.26 SAFETY SIGN**

- A. Provide a Safety Sign where directed by Resident Engineer. 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 Resident Engineer.
- D. Standard Detail Drawing Number SD10000-02(Found on VA TIL at <http://www.cfm.va.gov/til/sDetail/Div01GenReq/SD010000-02.pdf>) of safety sign showing required legend and other characteristics of sign is made a part of this specification
- E. Post the number of accident free days on a daily basis.

**1.27 HISTORIC PRESERVATION**

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

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**SECTION 01 00 11**  
**MEDICAL CENTER REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 GENERAL INTENTION:**

- A. This document pertains to station policy for construction projects performed at the Veterans Affairs Medical Center, VA Central Iowa Healthcare System. Safety and health concerns are taken seriously at this facility. Both our staff and yours are expected to strictly adhere to the regulations and requirements. This is exceedingly important, since we must be primarily concerned for the safety of our patients. In this regard, OSHA Standards may protect worker safety and health, but they have minimal benefit for protecting the safety and health of our patients, due primarily to their differing medical conditions. Review this information as orientation with your personnel performing work on site.

**1.2 REQUIREMENTS:**

- A. Security:
1. Secure all construction areas, especially mechanical and electrical rooms against entry of unauthorized individuals including patients.
  2. Notify the Contracting Officer's Representative (COR) for permission to work after hours and weekends. Standard work hours for the medical center are Monday–Friday, 8:00 a.m. to 4:30 p.m.
- B. Key Security:
1. Only a limited number of keys will be issued to the contractor.
  2. Ensure all doors leading to and from construction are either monitored or locked to prevent access to the area from unauthorized persons.
- C. General Safety:
1. Follow all federal, state and local safety and health regulations.
  2. Maintain safety in the construction site/area in accordance with the provisions of the contract that includes the Occupational Safety and Health Administration (OSHA) Regulations; National Electrical Codes; National Fire Protection Association (NFPA) 70, National Electric Code; and NFPA 101, Life Safety Code. Work in a safe manner and take all proper precautions while performing your work. Extra precautions shall be taken when working around persons occupying the building during construction.
  3. Provide Personal Protective Equipment (PPE) for your employees.
  4. Post appropriate signs in specific hazardous areas.

5. Keep tools, ladders, etc., away from patients to prevent injuries.
- D. Safety Inspections: The professional Occupational Safety and Health staff at this facility will perform safety inspections of all contract operations. Written reports of unsafe practices or conditions will be reported to the COR and Contracting Officer for immediate attention and resolution.
- E. Fire Alarms:
1. The fire alarm system connects all buildings at this facility, and is activated by various heat, duct, manual pull stations and smoke sensors. Manual pull stations are provided at each entrance. Please survey the area in which you are working to locate the manual pull stations.
  2. In the event of a fire alarm sounding, you are to remain in your area, unless medical center personnel (Safety, Nursing or Engineering) instruct otherwise, or unless a fire situation is in your area, in which case you should immediately evacuate.
  3. Any work involving the fire protection systems will require written permission to proceed from the COR.
  4. Do not tamper with or otherwise disturb any fire alarm system components without prior written permission. To do so without written permission will result in an adverse action.
- F. Hazardous Materials:
1. Many of the operations you are scheduled to perform may involve the use of hazardous materials. Prior to locating hazardous materials on site, all Material Safety Data Sheets (MSDS) will be submitted through the COR for evaluation by the facility Safety Officer with sufficient advance notice to allow proper training of staff.
  2. Storage of hazardous materials within buildings will be minimal with only enough on hand to perform daily work tasks. Flammable materials will either be removed from buildings at the end of the work shift or stored in approved flammable storage containers.
  3. Care must be taken to ensure adequate ventilation to remove vapors of hazardous materials in use. Many of the patients being cared for in the facility are susceptible to environmental contaminants, even when odors seem minimal. You will isolate those areas where vapors are produced, and ventilate to the greatest extent possible to reduce the number of complaints.
- G. Airborne Dust Control During Construction:
1. Generation of dust is of major concern for staff and especially in patient occupied buildings. Where operations involve the generation of dust, all efforts will be directed at reducing airborne generated dust to the lowest level feasible. This may be accomplished by a number of methods. These include misting the area with water, or use of tools attached to high

efficiency particulate air (HEPA) filtering vacuums. Where large amounts of materials may be disturbed, resulting in airborne dust, establishment of full ceiling-to-floor plastic barriers may be required.

2. Classification of Jobs:

- a. CLASS I - Includes, but is not limited to, minor disturbances involving plumbing, electrical, carpentry, ductwork and minor aesthetic improvements.
- b. CLASS II - (projects require barrier precautions) - Includes, but is not limited to, construction of new walls, construction of new rooms, major utility changes, major equipment installation, demolition of wallboards, plaster, ceramic tiles or ceiling and floor tiles, removal of windows, removal of casework, etc.

H. Class I Procedures:

1. Mist (with water) work surfaces to control dust while cutting. Alternatively a high efficiency particulate air vacuum (HEPA) can be used by positioning the vacuum next to the equipment at the use site.
2. Tape doors for activities that produce large amounts of dust, and block off and seal air vents.
3. Cover holes/openings (penetrations), in walls, ceiling, floors or door that cannot be patched or fixed within 4 hours. Only approved fire-rated materials will be used to fill holes in fire/smoke walls.
4. Comply with the OSHA regulations regarding noise and vapor containment.
5. Cleanup and disposal: Construction waste must be contained before transport using plastic bags and/or covered transport receptacle and/or cart and tape covering.
6. Wet mop and/or HEPA vacuum before leaving work area.
7. Place dust mats at entrance and exit of work area, and clean or change daily to prevent tracking of dust into occupied areas.
8. After work completion, remove covering from air vents.

I. Class II (Post Construction Warning Signs):

1. Same procedures as Class I - however, use of a HEPA vacuum is mandatory.
2. Construct all dust barriers before construction begins per the following instructions: For single rooms, seal door/frame with tape and plastic. The sheet should be divided vertically with a knife. Flaps should be taped on either side of the single sheet to create a flapped entrance.
3. For larger areas, install an airtight (fire retardant) plastic barrier that extends from floor to ceiling, or seal to prevent dust and debris from escaping. Seal all seams with duct tape.

Install barrier partitions to stop movement of air and debris penetrating ceiling envelopes, chases and/or ceiling spaces. Construct entrance with a double flap of plastic to prevent escape of debris; or, if elevator shafts or stairways are within the field of construction, install solid barriers.

J. Contact with Asbestos Containing Materials (ACM):

1. Due to the age of buildings, many contain asbestos containing materials (ACM). Primary ACM uses in the medical center includes floor tile, mastic, piping and HVAC insulation. The medical center has performed a comprehensive asbestos survey and has identified accessible ACM. Some areas contain damaged asbestos and should not be accessed without prior abatement.
2. The most common type of ACM insulation you may encounter includes thermal system insulation (TSI) and floor tile. ACM TSI is generally covered with a cloth wrap or lagging, and the asbestos substrate generally appear white in color. Do not sand, drill, gouge or otherwise disturb this type of insulation. Contractors disturbing or releasing asbestos containing materials will be liable for all damages and cleanup costs.
3. Where disturbance of asbestos is likely, it has been addressed in the contract for removal. If contact with the presence of asbestos is presented, stop all work in the immediate area and immediately contact the COR or Safety Officer to make necessary arrangements for removal.
4. In some areas, asbestos insulation has been identified on elbows, between fiberglass piping insulation, as patching materials among the fiberglass insulation. Fiberglass insulation used in this facility is usually yellow or pink in color, wrapped either by cloth or paper lagging.
5. To protect and ensure all your employees are aware that asbestos containing materials have been used in the construction of this facility, you are required to have them review this section and complete the awareness statement included as Attachment A. Once this documentation has been signed by all employees, forward to the COR for documentation.
6. A complete assessment of asbestos materials and conditions are available for viewing by contacting the facility Safety Officer. Prior to performing work above any ceiling or starting in a new area, consult with the COR concerning existing conditions of ACM.
7. Some of the areas in the facility are identified as restricted areas due to condition of ACM. These are readily labeled. Do not enter these areas unless first contacting the COR. Entry requirements to these areas are awareness of the hazards, proper protective clothing (coveralls and respirators) and personal monitoring in accordance with OSHA requirements.

8. Submit contractor asbestos awareness statements for all persons working on the site prior to commencing work.

K. Environmental Protection:

1. It may help you to be aware of the seriousness with which the environmental protection requirements of each contract are regarded. Adherence to these requirements is subject to continuing scrutiny from the community and backed by severe penalties, such as fines and incarceration. These environmental requirements will be strictly enforced.
2. No hazardous materials will be disposed of on Government property. All waste will be hauled off-site or disposed in contractor owned and operated waste removal containers.
3. A copy of all waste manifests for special or hazardous wastes will be forwarded to the COR. Environmental requirements will be strictly enforced.

L. Permit Required Confined Spaces:

1. Contractors performing work on this facility will follow all requirements outlined in OSHA Standards for working in confined spaces. There are numerous permits required for confined spaces on this facility. These spaces have been identified. Some spaces have been posted, but the majority have not due to their configuration. A complete listing of these areas is located in the Safety Office.
2. Confined spaces are areas that are large enough to be entered, have limited egress/exit potential and are not designed for permanent human occupancy. If you encounter any space that meets this definition, and if it is a suspected confined space, please contact the COR.
3. Contractors performing work in confined spaces are responsible for compliance with all applicable standards and regulations.

M. Housekeeping:

1. Protect patients and VA personnel in occupied areas from the hazards of dust, noise, construction debris and material associated with a construction environment. Keep work area clear, clean and free of loose debris, construction materials and partially installed work that would create a safety hazard or interfere with VA personnel duties and traffic.
2. Wet mop occupied areas clean and remove any accumulation of dust/debris from cutting or drilling from any surface at the end of each workday.
3. Make every effort to keep dust and noise to a minimum at all times. Take special precautions to protect VA equipment from damage including excessive dust.
4. Maintain clear access to mechanical, electrical devices, equipment and main corridors. This will ensure access to existing systems in the event of an emergency.

5. Clean area of all construction debris and dust upon completion of demolition and/or renovation.
6. During construction operations, keep existing finishes protected from damage. Cover and protect all carpets during construction. Any carpets or surfaces damaged as a result of construction activities will be replaced at the contractor expense.

N. Hot Work Permits:

1. Any hot work operations including cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipes or any other similar activity, will require a Hot Work Permit to be obtained by the COR. The Contractor will be responsible for conforming to all Medical Center regulations, policies and procedures concerning Hot Work Permits as outlined below:
  - a. Prior to the performance of hot work in patient-occupied buildings, a request for a Hot Work Permit will be made to the COR.
  - b. The COR will inspect the area and ensure that the requirements of NFPA 241 and OSHA standards have been satisfied. The Hot Work Permit will be granted and will be posted in the immediate area of the work.
  - c. The Hot Work Permit will apply only to the location identified on the permit. If additional areas involve hot work, additional permits must be requested.
  - d. Upon completion of all hot work, the COR will be notified by the responsible individual to perform a re-inspection of the area.
2. Do not use any of the extinguishers in the medical center for standby purpose while conducting hot work. Contractors are required to supply their own Class ABC extinguishers. Medical center extinguishers are only to be used in the event of a fire.

- O. Emergency Medical Services: Emergency medical services for stabilization purposes are available for contractors at this facility. For medical emergencies, dial "0" when inside any building. Report the nature of the emergency and location. The operator will dispatch in-house personnel or coordinate an outside emergency assistance based on the nature of the emergency.
- P. Use of Government-Owned Material and Equipment: Use of Government-owned material and equipment is prohibited.
- Q. Superintendent Communications: At all times during the performance of this contract, the Contractors Superintendent is to be available by cellular phone. At the beginning of the contract and prior to beginning any construction, supply the COR with the telephone number for the Superintendent.

- R. Parking: Contractor employees shall be assigned a parking area during the preconstruction meeting.
- S. Traffic:
  - 1. Traffic hazards are minimal at this facility. Drivers should be particularly concerned with pedestrian traffic.
  - 2. Seat belt use is mandatory on the station.
  - 3. Federal police officers maintain a 24-hour patrol of the area.
- T. Contractor's Trailers: Contractor's trailers shall be located at the area assigned. All utility connections to the trailer shall be installed at the contractor expense. Trailer removal is required upon completion of the contract.
- U. Smoking: No smoking is permitted in buildings or around hazardous areas. Any smoking inside a government building is subject to a fine without warning.

- - - END - - -



**SECTION 01 23 00**  
**ALTERNATES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Description of alternates.
- B. Definitions and administrative procedures related to alternates.
- C. List of Alternates.

**1.2 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Form will be reviewed and accepted or rejected by the Owner in accordance with INSTRUCTIONS, CONDITIONS AND OTHER STATEMENTS TO BIDDERS/OFFERERS, Part I-The Schedule, Section B. Accepted alternates will be identified in the SF1442, SOLICITATION, OFFER, AND AWARD FORM.
- B. Coordinate related work and modify surrounding work to integrate the Work of each alternate.

**1.3 SCHEDULE OF ALTERNATES**

- A. Base Bid Construction:

Construct approximately 7800 SF of a new one-story addition to house the Emergency Department and renovation of approximately 1670 SF of the existing Building No. 1. Work includes general construction, alterations, site work, utility systems, mechanical and electrical work, necessary removal of existing structures and construction, and certain other items in accordance with Drawings and Specifications.

- B. Alternate Delete No. 1: Omit Public Drop-Off Canopy.

Construct approximately 7800 SF of a new one-story addition to house the Emergency Department and renovation of approximately 1670 SF of the existing Building No. 1. Work includes general construction, alterations, site work, utility systems, mechanical and electrical work, necessary removal of existing structures and construction, and certain other items in accordance with Drawings and Specifications.

Omit the public drop-off canopy, support columns, canopy drainage and related items. In its place provide a roof over the Entry Vestibule and related modifications to the Vestibule and Lobby exterior walls. Provide roof drainage for the lower roof and additional vestibule wall panels, glazing, and other related modifications as indicated on Drawings. Retain column footings for future installation.

- C. Alternate Delete No. 2: Omit Drop-Off Canopy and Interior Remodel.

Construct approximately 7800 SF of a new one-story addition to house the Emergency Department and minor renovation of the existing Building No. 1. Work includes general construction, alterations, site work, utility systems, mechanical and electrical work, necessary removal of existing structures and construction, and certain other items in accordance with Drawings and Specifications.

Omit the public drop-off canopy, support columns, canopy drainage and related items. In its place provide a roof over the Entry Vestibule and related modifications to the Vestibule and Lobby exterior walls. Provide roof drainage for the lower roof and additional vestibule wall panels, glazing, and other related modifications as indicated on Drawings. Retain column footings for future installation.

Omit interior remodel Work generally north of Grid B, including demolition, new partitions, finishes, mechanical, plumbing and electrical, except as noted.

**D. Alternate Delete No. 3: Omit Drop-Off Canopy, Interior Remodel, and New Waiting Addition.**

Construct approximately 7800 SF of a new one-story addition to house the Emergency Department and minor renovation of the existing Building No. 1. Work includes general construction, alterations, site work, utility systems, mechanical and electrical work, necessary removal of existing structures and construction, and certain other items in accordance with Drawings and Specifications.

Omit the public drop-off canopy, support columns, canopy drainage and related items.

Omit interior remodel Work generally north of Grid B, including demolition, new partitions, finishes, mechanical, plumbing and electrical, except as noted.

Omit new construction generally east of Grid 3 including architectural, structural, mechanical, plumbing, and electrical components as indicated on Drawings. Revise precast wall panels and door construction at Grid 3 north of Grid E. Revise site construction and grading as indicated.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

--- END ---

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

**PART 1 - GENERAL**

**1.1 REFERENCED DOCUMENTS**

- A. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91).
- B. Electronic submittals: Section 01 33 24, ELECTRONIC SUBMITTAL PROCESS.
- C. Procedures for require tests: Section 01 45 29. TESTING LABORATORY SERVICES.

**1.2 DEFINITIONS**

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

**1.3 GENERAL REQUIREMENTS**

- A. All submittals except color samples, color charts, or physical material samples shall be made via an electronic, web-based exchange service. See Section 01 33 24, ELECTRONIC SUBMITTAL PROCEDURES for specific requirements.
- B. 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:
  - 1. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - 2. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - 3. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- C. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
  - 1. Allow 10 days for Architect/Engineer review
  - 2. Allow 14 days for VA review after completion of review by Architect/Engineer.

- D. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- E. 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.
- F. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88).
- G. 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.
- H. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- I. Before submittal, all submittals shall be reviewed by technically qualified employees of Contractor for accuracy, completeness, and compliance with contract requirements and coordinated with the rest of the work. After technical review, submittals shall be stamped and signed (not initialed) by Contractor certifying to such check.

#### **1.4 PROCEDURES**

- A. 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.
- B. Transmittal Letter
  - 1. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor.
  - 2. Letter shall be sent directly to the Resident Engineer and the Architect/Engineer electronically.

3. Letter shall contain the list of items, name of Medical Center, name of Contractor, contract number, Architect/Engineer's project 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.
4. 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.
5. A space 120 mm by 216 mm (4-3/4 by 8-1/2 inches) shall be reserved on each submittal to accommodate approval or disapproval stamp.

C. Individual Submittals

1. Catalog data and all submittals referencing more than one item shall be marked to indicate specific items submitted for approval.
2. Shop Drawings, Product Schedules and Manufacturer's Literature and Data:
  - a. If submitted in digital (electronic) form, submit one copy.
  - b. If submitted in hardcopy, submit at least three copies, two of which will be retained (on the Architect and one by the Resident Engineer). Any copies above two will be returned to the Contractor with comments.
  - c. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
3. Schedules: 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.
4. Certificates:
  - a. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
  - b. Submit in quadruplicate.
5. Samples:
  - a. Submit samples in single units unless otherwise specified.

- D. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- E. Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

David Unick  
Brooks Borg Skiles Architects  
317 6<sup>th</sup> Ave, Suite 400  
Des Moines, IA 50309

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**SECTION 01 33 24**  
**ELECTRONIC SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

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

**1.2 REFERENCED DOCUMENTS**

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

**1.3 SUMMARY:**

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

**1.4 GENERAL DESCRIPTION OF PROCEDURES:**

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

- E. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.

## **1.5 REQUIREMENTS AND RESPONSIBILITIES**

### **A. Submittal Exchange Service shall provide:**

1. Web-based tracking and approval system.
2. Automated email notice for new submittals and reminders for submittals approaching the review deadline.
3. Tracking and exchange of ITC/RFI/CO's and other similar document as well as product and equipment submittals.
4. Means for tracking of the status such documents including whether they have been approved and released by the Owner.
5. Organized storage of submittals that is accessible for review by the designated construction team members at any time.
6. Submit a complete set of submittal on CD to the Owner at the end of the Project. Include all submittals included product submittals, shop drawings, ITC/RFI/CO's and other similar submittals.

### **B. Contractor responsibilities:**

1. Contractor shall pay the cost of the service.
  - a. The cost of services shall be paid in full by the Contractor. Contractor shall include the full cost of the service and all related costs in their proposal.
  - b. Training in the use of the service by the team members shall be at the option of the Contractor and, if chosen, shall be paid by the Contractor
2. Contractor shall have or obtain required hardware and software: Internet Service and Equipment Requirements:
  - a. Email address and Internet access at Contractor's main office.
  - b. Adobe Acrobat ([www.adobe.com](http://www.adobe.com)), Bluebeam PDF Revu ([www.bluebeam.com](http://www.bluebeam.com)), or other similar PDF review software for applying electronic stamps and comments.
3. Contractor shall prepare or have prepared all required submittals in the PDF format required.
  - a. PDF files must be readable. As a general rule, a resolution of 300 dpi should be used.
  - b. If the Architect can download more readable product data directly from the manufacturer's website than was submitted by the Contractor, the Architect shall reserve the right to reject the submittal.

4. Other responsibilities for submittals shall be as described in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

a. Color samples, color charts, or physical material samples shall be submitted as described in Section 01 33 23.

**1.6 ACCEPTABLE SERVICES**

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

--- END ---



## SECTION 01 45 29 TESTING LABORATORY SERVICES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION:

- A. This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by the Contractor

1. Testing laboratory shall be approved by the VAMC.

#### 1.2 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
- T27-06.....Sieve Analysis of Fine and Coarse Aggregates
  - T96-02 (R2006) .....Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
  - T99-01 (R2004) .....The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
  - T104-99 (R2003) .....Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
  - T180-01 (R2004) .....Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
  - T191-02(R2006) .....Density of Soil In-Place by the Sand-Cone Method
- C. American Concrete Institute (ACI):
- 506.4R-94 (R2004) .....Guide for the Evaluation of Shotcrete
- D. American Society for Testing and Materials (ASTM):
- A325-06 .....Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  - A370-07 .....Definitions for Mechanical Testing of Steel Products
  - A416/A416M-06.....Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
  - A490-06 .....Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
  - C31/C31M-06 .....Making and Curing Concrete Test Specimens in the Field
  - C33-03 .....Concrete Aggregates

C39/C39M-05 .....	Compressive Strength of Cylindrical Concrete Specimens
C109/C109M-05 .....	Compressive Strength of Hydraulic Cement Mortars
C138-07 .....	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
C140-07 .....	Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-05 .....	Slump of Hydraulic Cement Concrete
C172-07 .....	Sampling Freshly Mixed Concrete
C173-07 .....	Air Content of freshly Mixed Concrete by the Volumetric Method
C330-05 .....	Lightweight Aggregates for Structural Concrete
C567-05 .....	Density Structural Lightweight Concrete
C780-07 .....	Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-08 .....	Sampling and Testing Grout
C1064/C1064M-05 .....	Freshly Mixed Portland Cement Concrete
C1077-06 .....	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
C1314-07 .....	Compressive Strength of Masonry Prisms
D698-07 .....	Laboratory Compaction Characteristics of Soil Using Standard Effort
D1143-07 .....	Piles Under Static Axial Compressive Load
D1188-07 .....	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D1556-07 .....	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-07 .....	Laboratory Compaction Characteristics of Soil Using Modified Effort
D2166-06 .....	Unconfined Compressive Strength of Cohesive Soil
D2167-94(R2001).....	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2216-05 .....	Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

- D2922-05 .....Density of soil and Soil-Aggregate in Place by Nuclear Methods  
(Shallow Depth)
- D2974-07 .....Moisture, Ash, and Organic Matter of Peat and Other Organic  
Soils
- D3666-(2002).....Minimum Requirements for Agencies Testing and Inspection  
Bituminous Paving Materials
- D3740-07 .....Minimum Requirements for Agencies Engaged in the Testing  
and Inspecting Road and Paving Material
- E94-04.....Radiographic Testing
- E164-03.....Ultrasonic Contact Examination of Weldments
- E329-07 .....Agencies Engaged in Construction Inspection and/or Testing
- E543-06.....Agencies Performing Non-Destructive Testing
- E605-93(R2006) .....Thickness and Density of Sprayed Fire-Resistive Material  
(SFRM) Applied to Structural Members
- E709-(2001) .....Guide for Magnetic Particle Examination
- E1155-96(R2008) .....Determining FF Floor Flatness and FL Floor Levelness Numbers
- E. American Welding Society (AWS):
  - D1.1-07 .....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.; E 329, C 1077, D 3666, D3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.

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

#### **1.4 SUBMITTAL PROCEDURES**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. 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.
- C. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
- D. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
- E. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
- F. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
- G. 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.
- H. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION**

##### **3.1 EARTHWORK:**

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

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

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO T99, ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D2922 or AASHTO T238 wherever possible. Field density tests utilizing ASTM D1556, AASHTO T191 and/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 Resident Engineer before the tests are conducted.
  - a. Building Slab Subgrade: At least one test of subgrade for every 185 m<sup>2</sup> (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m<sup>2</sup> (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
  - b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
  - c. Pavement Subgrade: One test for each 335 m<sup>2</sup> (400 square yards), but in no case fewer than two tests.

- d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
- e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
- f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to Resident Engineer. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.
- C. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.
- D. Testing Materials: Test suitability of on-site and off-site borrow as directed by Resident Engineer.

### **3.2 FOUNDATION PILES:**

- A. Witness load test procedure for conformance with ASTM D1143 and interpret test data to verify geotechnical recommendations for pile capacity. Submit load test report in accordance with ASTM D1143.
- B. Review Contractor's equipment, methods, and procedures prior to starting any work on site. Provide continuous inspection of pile installation. Maintain a record of all pertinent phases of operation for submittal to Resident Engineer.
- C. Auger-Placed Piles: Take and test samples of grout in accordance with ASTM C109 for conformance with specified strength requirements. Not less than six cubes shall be made for each day of casting. Test three cubes at 7 days and three at 28 days.

### **3.3 ASPHALT CONCRETE PAVING:**

- A. Aggregate Base Course:
  - 1. Determine maximum density and optimum moisture content for aggregate base material in accordance with ASTM D1557, Method D.
  - 2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with AASHTO T191 or ASTM D1556.

3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.

B. Asphalt Concrete:

1. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

### **3.4 SITE WORK CONCRETE:**

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

### **3.5 CONCRETE:**

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of Resident Engineer with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by Resident Engineer.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Resident Engineer.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with

the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.

3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m<sup>3</sup> (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by Resident Engineer make three cylinders for each 80 m<sup>3</sup> (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an identification number. Resident Engineer may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m<sup>3</sup> (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m<sup>3</sup> (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
  - a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air

- temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
- b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
  12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
  13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
  14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
  15. Observe preparations for placement of concrete:
    - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
    - b. Inspect preparation of construction, expansion, and isolation joints.
  16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
  17. Observe concrete mixing:
    - a. Monitor and record amount of water added at project site.
    - b. Observe minimum and maximum mixing times.
  18. Measure concrete flatwork for levelness and flatness as follows:
    - a. Perform Floor Tolerance Measurements  $F_F$  and  $F_L$  in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    - b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.

- c. Provide the Contractor and the Resident Engineer with the results of all profile tests, including a running tabulation of the overall  $F_F$  and  $F_L$  values for all slabs installed to date, within 72 hours after each slab installation.
- 19. Other inspections:
  - a. Grouting under base plates.
  - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
- C. Laboratory Tests of Field Samples:
  - 1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by Resident Engineer. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
  - 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
  - 3. Furnish certified compression test reports (duplicate) to Resident Engineer. In test report, indicate the following information:
    - a. Cylinder identification number and date cast.
    - b. Specific location at which test samples were taken.
    - c. Type of concrete, slump, and percent air.
    - d. Compressive strength of concrete in MPa (psi).
    - e. Weight of lightweight structural concrete in  $\text{kg/m}^3$  (pounds per cubic feet).
    - f. Weather conditions during placing.
    - g. Temperature of concrete in each test cylinder when test cylinder was molded.
    - h. Maximum and minimum ambient temperature during placing.
    - i. Ambient temperature when concrete sample in test cylinder was taken.
    - j. Date delivered to laboratory and date tested.

### **3.6 REINFORCEMENT:**

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

- D. D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

### **3.7 PRESTRESSED CONCRETE:**

- A. Inspection at Plant: Forms, placement and concrete cover of reinforcing steel and tendons, placement and finishing of concrete, and tensioning of tendons.
- B. Concrete Testing: Test concrete including materials for concrete required in Article, CONCRETE of this section, except make two test cylinders for each day's production of each strength of concrete produced.
- C. Test tendons for conformance with ASTM A416 and furnish report to Resident Engineer.
- D. Inspect members to insure that specification requirements for curing and finishes have been met.

### **3.8 ARCHITECTURAL PRECAST CONCRETE:**

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

### **3.9 MASONRY:**

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

### **3.10 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. Test according to one of the following
      - 1) Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
        - a) 20 percent of all shear plate fillet welds at random, final pass only.

- b) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
    - c) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
    - d) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
    - e) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.
  - 2) 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.
  - f. Verify that correction of rejected welds are made in accordance with AWS D1.1.
  - g. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.
2. Bolt Inspection:
- a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
  - b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
  - c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
  - d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
  - e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.

3. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.
- D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to Resident Engineer.

### **3.11 STEEL DECKING:**

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

### **3.12 SPRAYED-ON FIREPROOFING:**

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

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**SECTION 01 57 19**  
**TEMPORARY ENVIRONMENTAL CONTROLS**

**1.01. 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.

**1.02. 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.

**1.03. 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

**1.04. SUBMITTALS**

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

applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.

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

#### **1.05. PROTECTION OF ENVIRONMENTAL RESOURCES**

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Resident Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
  - 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before

- construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
    - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
    - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
    - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
  3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
  4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
    - a. Reuse or conserve the collected topsoil sediment as directed by the Resident Engineer. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
    - b. 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 on the Environmental Protection Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
  6. Manage borrow areas on and off Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
  7. Manage and control spoil areas on and off Government property to limit spoil to areas shown and prevent erosion of soil or sediment from entering nearby water courses or lakes.

8. Protect adjacent areas from despoilment by temporary excavations and embankments.
  9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
  10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
  11. Handle discarded materials other than those included in the solid waste category as directed by the Resident Engineer.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
  2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
  3. Monitor water areas affected by construction.
- D. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Resident Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m. unless otherwise permitted by local ordinance or the Resident Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

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

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:

- a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

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

- b. Use shields or other physical barriers to restrict noise transmission.
- c. Provide soundproof housings or enclosures for noise-producing machinery.
- d. Use efficient silencers on equipment air intakes.
- e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
- f. Line hoppers and storage bins with sound deadening material.
- g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any

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

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

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**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Transportation, handling, storage and protection.

**1.2 RELATED SECTIONS**

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

**1.3 DEFINITIONS**

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components authorized for reuse.
- B. Furnish: To supply and deliver, unload, inspect for damage (same as supply).
- D. Install: To unpack, assemble, erect, apply, place, connect, finish, cure, protect, clean, and ready for use.
- E. Provide: To furnish or supply, plus install.
- F. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
- G. Supply: To supply and deliver, unload, inspect for damage (same as furnish).

**1.4 SUBMITTALS**

- A. See Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

**PART 2 PRODUCTS**

**2.1 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents or specifically authorized in writing by Resident Engineer.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor and shall be removed from site.

## **2.2 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacture for components being replaced.

## **2.3 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One Product and indicating “Basis of Design”: Applicable characteristics of named product were used to design systems. A formal substitution is required if another product is proposed. See Article 3.1.A below. Submittals must include sufficient data to show that the product has the same or similar characteristics to the products so indicated. Submittal must clearly indicate modifications to other portions of the work which will be required as a result of the substitution. The Architect/Engineer may reject any product, which, in his/her opinion, is not sufficiently similar to the indicated product.
  - 1. Substitutions will be considered except where specifically noted “No substitutions”

## **PART 3 EXECUTION**

### **3.1 SUBSTITUTION PROCEDURES**

- A. Substitution requests during bidding periods shall be in accordance with INSTRUCTIONS, CONDITIONS AND OTHER STATEMENTS TO BIDDERS/OFFERORS, Article 4.13 “VAAR 852.211-73, Brand Name Or Equal (Jan 2008)”.
- B. A request for substitution will be considered after the bidding period when one or more of the following are true:
  - 1. The product will provide a cost savings to the Owner.
  - 2. The specified product is no longer available. This does not include Contractor’s failure to order in a timely manner.
  - 3. The proposed product will improve the project schedule.
  - 4. The proposed product offers significantly improved performance for the same or similar cost.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other Work which may be required as a result of the substitution in order for the Work to be complete with no additional cost to Owner.
  4. Waives claims for additional costs or time extension which may subsequently become apparent.
  5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
  2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  3. Attached product data as specified in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
  4. Identify product by Specification Section and Article Numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.
  5. List similar projects using product, dates of installation, and names and phone numbers of Architect and Owner.
  6. Give itemized comparison of proposed substitution with specified product, listing quality and performance variations, and reference to Specification Section and Article Number.
  7. Give cost data comparing proposed substitution with specified product, and amount of net change to Contract price.
  8. List nearest availability of maintenance services and replacement materials.
  9. State effect of substitution on construction schedule, and changes required in other work or products.
- G. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.
- H. Acceptance of a substitute manufacturer does not waive or alter any specified product requirement.

### **3.2 TRANSPORTATION AND HANDLING**

- A. Inform subcontractors and suppliers of complete address of project, with all instructions necessary for properly directing deliveries to site.
- B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Transport and handle products as necessary to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- F. Promptly inspect all deliveries for the presence of mold. Immediately reject and require removal from the site of all items on which mold is present.
- G. Materials or products which arrive at the site wet or with a moisture content above that designated in the Specification and which have no indication of mold shall be dried out or dried to recommended moisture content level by quickest possible means which will not damage the product or material.
- H. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.3 STORAGE AND PROTECTION**

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
  - 1. Take measures as necessary to prevent moisture in products or materials or in the environment around the material at a level which would permit growth of mold.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Prevent contact with material that may cause corrosion, discoloration, or staining.

- I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

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**SECTION 01 73 29**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Cutting
- B. Patching
- C. Minor modifications to assure exposed surfaces retain a finished appearance.

**1.2 SUBMITTALS**

- A. Product Data: Submit all materials to be used in patching that are not submitted under another Section of this Specification.
- B. Cutting and Patching Proposal:
  - 1. Where cutting or patching is found to be necessary to accomplish the Work as described in the Construction Document, provide a description of the cutting and/or patching to be done and the reason it is required. Include what materials and utilities will be affected.
- C. Approval by the Owner to proceed with cutting and patching does not waive the Owner's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

**1.3 PAYMENT FOR COSTS**

- A. Contractor shall be responsible for all costs of cutting and patching specifically stated in or reasonably implied by the Work described in the Construction Documents.
- B. Contractor shall be responsible for all costs of cutting and patching caused by ill-timed or defective work, or work not conforming to contract documents, including costs for additional services of the Architect/Engineer or Owner.

**1.4 QUALITY ASSURANCE**

- A. Employ skilled workmen to perform cutting and patching. Where work is of a specific trade (such as plaster) engage tradesmen skilled in that trade to execute the Work.
- B. Requirements for Structural Work: Do not cut or patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
  - 1. Obtain approval of the cutting and patching proposal before cutting and patching structural elements including, but not limited to, the following:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Structural concrete.
    - d. Structural steel.

- e. Preformed metal panels
  - f. Lintels
  - g. Timber and primary wood framing.
  - h. Structural decking.
  - i. Stair systems.
  - j. Miscellaneous structural metals.
  - k. Equipment supports.
  - l. Piping, conduits, ductwork, vessels and equipment.
2. Where a core drill is required through a floor or wall, verify the location of the concrete webs, steel joints or other structural elements below the slab or inside or on the other side of the wall before drillings and adjust location or request direction from the A/E as necessary.
- C. Operational and Safety Limitations: Do not cut or patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems including, but not limited to, the following:
- a. Shoring, bracing, and sheeting.
  - b. Primary operational systems and equipment.
  - c. Air or smoke barriers.
  - d. Water, moisture, or vapor barriers.
  - e. Membrane and flashings.
  - f. Fire protection systems.
  - g. Noise and vibration control elements and systems.
  - h. Control systems.
  - i. Communication systems.
  - j. Conveying systems.
  - k. Electrical wiring systems.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Use materials for patching that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

1. All substitute materials must be approved by the Owner before they may be used on the project.
- B. Use materials whose thermal, chemical or similar properties will not adversely affect the existing materials to remain.
- C. Where new materials are described in this Construction Documents provide patching materials that conform to those specifications in regard to quality unless otherwise indicated.
- D. Where no specific description of materials is found in the Construction Documents, provide materials of Professional or Commercial quality, heavy duty and top quality, meeting the highest commonly used standards in the trade or specialty under which the Work in question would normally be performed.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
- B. Where the cutting involves elements normally handled by differing trades, before proceeding, coordinate with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. To the extent possible, verify what is behind, under or over a surface before cutting or drilling into that surface.

### **3.2 PREPARATION**

- A. Temporary Support: Provide all temporary support of Work to be cut as required to maintain the structural integrity of the remaining construction and as necessary to provide for a safe environment.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Cutting of existing pipe, conduit or ductwork serving the building, which is indicated to be removed or relocated, must be schedule only after adequate provisions have been made to bypass them. Services must be maintained at all times.

### **3.3 PERFORMANCE**

- A. General
  1. Proceed with cutting and patching in a timely manner as required to prevent delay of the Work.

2. Provide all cutting of existing construction as necessary to provide for installation of other components or performance of other construction activities or the subsequent fitting and patching required to restore surfaces to their original condition.
  3. If utilities or structural elements of the construction are encountered which are not specifically noted on the Drawings, immediately inform the Architect/Engineer and await a response before proceeding.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction.
1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping.
  2. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces.
  3. Temporarily cover openings when not in use.
  4. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  5. Cut no utilities without specific, written authorization from the Owner.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  2. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
  3. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Wherever a patch occurs, refinish the entire surface to a point where the surface changes such as at a corner, a joint, a change in plane or a change in material or color.
    - b. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing the patch, after the patched area has received primer and second coat.
- D. Anchoring to Existing:
1. Do not anchor new items or new construction to existing construction in a way that will place an excessive load on the existing construction.
  2. Plaster and Gypsum Board

- a. Do not anchor anything directly to gypsum board or plaster, always anchor to the framing system or substrate to which the gypsum board or plaster is anchored. If necessary open the gypsum board or plaster wall, provide additional blocking and repair the surface.
- 3. Hollow Masonry
  - a. Do not anchor anything weighing more than 1 pound or capable of resulting in pressure being applied of more than 3 pounds in any direction to the face of hollow masonry.
  - b. Where loads heavier than those listed above must be anchored to hollow concrete block, provide one of the following:
    - 1) Open the core and grout solid at the core into which the anchor is to be placed plus at least one core above and two cores below where the anchor is to be placed. Patch and finish the surface of the block to match surrounding block.
    - 2) Provide a system that engages both walls of the concrete block and provides a rigid spacer/brace in the core between the walls similar to Hilti HIT HY 20 for Masonry Construction.
  - c. Under no circumstances use impact driven fasteners on hollow masonry unless the cores are grouted solid.

### **3.4 CLEANING**

- A. Thoroughly clean areas and spaces where cutting and patching is performed and areas used as access including cleaning piping, metal framing, conduits, ducts and other similar features.
- B. Thoroughly clean and prepare all surfaces before painting or other finishing is applied.
- C. Completely remove paint, mortar, oils, putty and items of similar nature that are not a part of the intended finish.

- - - END - - -



**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

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

**1.2 RELATED WORK**

- A. Safety Requirements and disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Reserved items which are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.

**1.3 GOVERNMENT POLICY**

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building construction products.
- B. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators and facilitate their recycling.
- C. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling and any revenues or savings obtained from salvage or recycling shall accrue to the Contractor.
- D. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by federal, state and local regulations.

**1.4 PLAN**

- A. Conduct a site assessment to estimate the types of materials that will be generated by demolition at the site. The Whole Building Design Guide website (<http://www.wbdg.org>) has a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects
- B. Develop and implement procedures to reuse and recycle materials to the greatest extent feasible based upon the contract, the construction and demolition debris management plan, the estimated quantities of materials, and the availability of recycling facilities.
- C. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
  - 1. Contractor and project identification information;
  - 2. Procedures to be used for debris management;

3. A listing of the materials to be reused, recycled, or taken to the landfill.
4. The names and locations of reuse and recycling facilities or sites.

#### **1.5 COLLECTION**

- A. Provide necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

#### **1.6 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 law.
- B. Building or demolition materials with no practical use or that cannot be recycled shall be disposed of at a landfill or incinerator.

#### **1.7 REPORT**

- A. With each application for progress payment, the contractor shall submit a 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.

- - - END - - -

**SECTION 02 31 00**  
**GEOTECHNICAL INVESTIGATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Geotechnical data obtained from site investigations and made available to the Contractor.

**1.2 GEOTECHNICAL INVESTIGATIONS**

- A. A Geotechnical investigation of the site for the Project was performed by:
- Geotechnical Services, Inc (GSI)  
10607 Aurora Avenue  
Urbandale, Iowa, 50322  
515-270 6542
- B. The report, dated July 2, 2010, is hereby made available to the Contractor for his/her consideration. Contractor remains responsible to make their own evaluation of the site to request modifications to the proposed construction if their investigations suggest the need for such.
- C. The GSI Report is included in the Appendix 1 at the end of this Project Manual.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

- - - END - - -



**SECTION 02 41 13**  
**SELECTIVE BUILDING AND SITE DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. 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. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- E. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.
- F. Related demolition requirements: Section 02 41 19, SELECTIVE DEMOLITION FOR REMODELING.

**1.3 PROTECTION:**

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

- D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- E. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Resident Engineer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Resident Engineer's approval.
- F. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

#### **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 Resident Engineer. Break up concrete slabs below grade that do not

require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

- 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 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- 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 Resident Engineer. When Utility lines are encountered that are not indicated on the drawings, the Resident Engineer shall be notified prior to further work in that area.

### **3.2 CLEAN-UP:**

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

--- E N D ---



**SECTION 02 41 19**  
**SELECTIVE DEMOLITION FOR REMODELING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Minor and partial demolition for alterations purposes, including underpinning operations.
- B. Abandonment and removal of existing utilities and utility structures.

**1.2 RELATED WORK**

- A. Requirements for isolation of construction areas: Section 01 00 11, MEDICAL CENTER REQUIREMENTS.
- B. Cutting and Patching: Section 01 73 29, CUTTING AND PATCHING
- C. Waster Management: Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT

**1.3 SUBMITTALS**

- A. Product Data: Submit all materials to be used in patching and in temporary enclosures that are not submitted under another Section of this Specification.
- B. Site Plan showing:
  - 1. Areas for temporary construction, barriers and enclosures.
  - 2. Areas for temporary and permanent placement of removed materials.
  - 3. Plan for closing off or partially closing off exterior access routes.
- C. Demolition Plan: Submit demolition plan to the Resident Engineer including the following:
  - 1. Schedule of utility shut offs, partial closure of access or pathways and other key items which may affect operations of the Facility.
  - 2. Measures planned to reduce noise and vibration and control dust.
  - 3. Sequencing of major portions of the Work, including timing between portions of the Work.
  - 4. Plans for closing off interior portions of the building to remain occupied during construction including submit materials and systems to be used.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**1.4 PROJECT CONDITIONS**

- A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- B. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as shown.

2. Report discrepancies to Architect/Engineer before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions.

## **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. Code of Federal Regulations (CFR):  
29 CFR 1926.....Occupational Safety and Health Standards.
- C. National Fire Protection Association (NFPA):  
241 .....Standard for Safeguarding Construction, Alteration, and Demolition Operations.

## **PART 2 - PRODUCTS**

### **2.1 TEMPORARY CLOSURE MATERIALS**

- A. Materials used for barriers, enclosures and other temporary structures may be new or used but must be in serviceable condition, safe and visually free of defect.
- B. Wood in contact with the public must not be an easy source of splinters.
- C. Barriers exposed to the public shall be painted a single color (e.g. not piece of old signs cut up with parts of many colors).
- D. Submit specific closure materials and systems to Resident Engineer for approval.
- E. See also Section 01 00 11, MEDICAL CENTER REQUIREMENTS.

### **2.2 PATCHING**

- A. See Section 01 73 29, CUTTING AND PATCHING for material requirements for patching materials.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  1. Verify that construction and utility arrangements are as shown.
  2. Report discrepancies to Architect/Engineer and the Resident Engineer before disturbing existing installation.
  3. Beginning of demolition work constitutes acceptance of existing conditions.

### **3.2 PREPARATION**

- A. Do not begin removal until receipt of notification to proceed from Resident Engineer.

- B. Do not proceed until barriers are in place and negative air pressure is established as described in Section 01 00 11, MEDICAL CENTER REQUIREMENTS.
- C. See Section 01 73 29, CUTTING AND PATCHING for temporary support and protection.
- D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

### **3.3 GENERAL REQUIREMENTS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
- B. Use of explosives is not permitted.
- C. Protect existing structures and other elements that are not to be removed. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 1. Prevent movement or settlement of adjacent structures.
  - 2. Stop work immediately if adjacent structures appear to be in danger and report condition to the Resident Engineer and Architect/Engineer.
- D. Conform to the requirements of Section 01 00 11, MEDICAL CENTER REQUIREMENTS erection and maintenance of temporary barriers and security devices. Separate areas in which demolition is being conducted from other areas that are still occupied.
- E. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
- F. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
- G. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- H. Obtain written permission from the Resident Engineer for any activity outside the limits indicated on the Drawings, including the path to be used by large construction equipment and trucks and dumpsters to and from the site.
- I. If hazardous materials are discovered during removal operations, stop work and notify Architect/Engineer and Resident Engineer; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- J. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Resident Engineer. Obtain required permits before modifying or disabling life safety system including exit pathways.

### **3.4 SELECTIVE DEMOLITIONS PROCEDURE**

- A. Remove existing work as indicated and as required to accomplish new work.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- C. Conform to Section 01 73 29, CUTTING AND PATCHING for all cutting and patching procedures.
  - 1. Repair and patch adjacent construction and finishes damaged during removal work as necessary:
    - a. Surfaces or elements which are scheduled to be removed or remodeled in a later phase of this project must be patched as required to provide stable construction. Patches may be temporary but must be of a nature which will serve until the finish construction scheduled for a later phase of this Project.
    - b. Surfaces or elements not scheduled to be removed or remodeled or refinished in later phases of this project, must be patched and finished in a permanent manner to match existing finishes.
- D. Separate areas in which demolition is being conducted from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions and sound barriers of construction conforming to Section 01 00 11, MEDICAL CENTER REQUIREMENTS and as approved by the Resident Engineer where shown on the drawings and as required to meet project requirements.

### **3.5 EXISTING UTILITIES**

- A. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  - 1. Protect existing utilities to remain from damage.
  - 2. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 4. Verify that abandoned services serve only abandoned facilities before removal.
- B. Cutting of existing pipe, conduit or ductwork serving the building, which is indicated to be removed or relocated, must be scheduled only after adequate provisions have been made to bypass them. Services must be maintained at all times.

- C. Coordinate work with Resident Engineer; notify before starting work and comply with requirements; obtain required permits. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 7 days prior written notification to Resident Engineer.
- D. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities where possible to do so, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Marking of Capped and Abandoned Services: Mark using highly visible tags or flags, protect from damage due to subsequent construction, using substantial barricades if necessary.
  - 1. At utilities or ductwork to be permanently capped and abandoned, provide a permanent type tag (metal or plastic) attached to the duct, pipe, conduit, etc. near the cap and containing the following information:
    - a. Utility carried (e.g. gas, hot water, return air, 240 V electrical, etc.)
    - b. Original source.
    - c. Original destination.
    - d. Note to which (if either) it is still connected.
    - e. Note whether the pipe, conduit or duct is active or contains anything.
    - f. Date capped.
  - 2. Utilities or ductwork to be temporarily capped may be tagged with less permanent tags (paper) but must carry the same information.

### **3.6 CLEANING**

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access including cleaning piping, metal framing, conduits, ducts and other similar features.

### **3.7 DEBRIS AND WASTE REMOVAL**

- A. Daily remove waste from areas where demolition is occurring.
- B. Keep area around dumpsters and other waste disposal facilities clean.
- C. Do not permit waste materials to blow about the site.

--- END ---



**SECTION 02 82 11**  
**ASBESTOS ABATEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. See Appendix 2 for Description of Asbestos Technical Specification prepared by Iowa Environmental Services.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

**3.1 SUMMARY**

- A. Execute the work described in Appendix 2 as a part of this Contract.

- - - END - - -



**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. Vapor barrier: Section 07 26 16, BELOW GRADE VAPOR RETARDER
- C. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- D. Excavation and Fill: Section 31 20 00, EARTH MOVING.

**1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:**

- A. Testing agency retained and reimbursed by the Contractor and approved by Resident Engineer.
- B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

**1.4 TOLERANCES:**

- A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).
- B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.
- C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and - 6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).

- D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:
1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.
  2. Maximum elevation change which may occur within 600 mm (2 feet) of any column or wall element is 6 mm (0.25 inches).
  3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 1500 mm (5 feet).

### **1.5 REGULATORY REQUIREMENTS:**

- A. ACI SP-66 – ACI Detailing Manual.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 301 – Standard Specifications for Structural Concrete.

### **1.6 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Shop Drawings: Reinforcing steel: Complete shop drawings
- C. Mill Test Reports:
  1. Reinforcing Steel.
  2. Cement.
- D. Manufacturer's Certificates:
  1. Abrasive aggregate.
  2. Lightweight aggregate for structural concrete.
  3. Air-entraining admixture.
  4. Chemical admixtures, including chloride ion content.
  5. Waterproof paper for curing concrete.
  6. Liquid membrane-forming compounds for curing concrete.
  7. Non-shrinking grout.
  8. Liquid hardener.
  9. Waterstops.
  10. Expansion joint filler.
  11. Adhesive binder.
  12. Moisture Vapor Emissions and Alkalinity Control Sealer.
  13. Breathable Penetrating Sealer / Densifier.

- 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 and fly ash ratio curves, concrete mix ingredients, and admixtures.
- G. Shoring and Reshoring Sequence: Submit for approval a shoring and reshoring sequence for flat slab/flat plate portions, 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 Resident Engineer (see FORMWORK) or Contractor.

#### **1.7 DELIVERY, STORAGE, AND HANDLING:**

- A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.
- B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement and fly ash in separate suitable bins.
- C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

#### **1.8 PRE-CONCRETE CONFERENCE:**

- A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.
- B. Agenda: Includes but is not limited to:
  - 1. Submittals.
  - 2. Coordination of work.
  - 3. Availability of material.
  - 4. Concrete mix design including admixtures.
  - 5. Methods of placing, finishing, and curing.
  - 6. Finish criteria required to obtain required flatness and levelness.
  - 7. Timing of floor finish measurements.
  - 8. Material inspection and testing.

- C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; lightweight aggregate manufacturer; admixture manufacturers; Resident Engineer; Consulting Engineer; testing laboratories for concrete testing and finish (F-number) verification.
- D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

## **1.9 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
  - 117-10 .....Tolerances for Concrete Construction and Materials
  - 211.1-91(R2009).....Selecting Proportions for Normal, Heavyweight, and Mass Concrete
  - 211.2-98(R2004).....Selecting Proportions for Structural Lightweight Concrete
  - 214R-02 .....Evaluation of Strength Test Results of Concrete
  - 301-10 .....Structural Concrete
  - 304R-00(R2009) .....Guide for Measuring, Mixing, Transporting, and Placing Concrete
  - 305R-10 .....Hot Weather Concreting
  - 306R-10 .....Cold Weather Concreting
  - 308R-01(R2008) .....Standard Practice for Curing Concrete
  - 309R-05 .....Guide for Consolidation of Concrete
  - 318-08 .....Building Code Requirements for Reinforced 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.....Steel Wire, Plain, for Concrete Reinforcement
  - A185/185M-07.....Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  - A615/A615M-09.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

A653/A653M-09.....	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
A706/A706M-09.....	Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A767/A767M-09.....	Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
A775/A775M-07.....	Epoxy-Coated Reinforcing Steel Bars
A820-06 .....	Steel Fibers for Fiber-Reinforced Concrete
A996/A996M-09.....	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
C31/C31M-09 .....	Making and Curing Concrete Test Specimens in the field
C33-08 .....	Concrete Aggregates
C39/C39M-09 .....	Compressive Strength of Cylindrical Concrete Specimens
C94/C94M-09 .....	Ready-Mixed Concrete
C143/C143M-10 .....	Slump of Hydraulic Cement Concrete
C150-09 .....	Portland Cement
C171-07 .....	Sheet Materials for Curing Concrete
C172-08 .....	Sampling Freshly Mixed Concrete
C173-10... .....	Air Content of Freshly Mixed Concrete by the Volumetric Method
C192/C192M-07 .....	Making and Curing Concrete Test Specimens in the Laboratory
C231-09 .....	Air Content of Freshly Mixed Concrete by the Pressure Method
C260-06 .....	Air-Entraining Admixtures for Concrete
C309-07 .....	Liquid Membrane-Forming Compounds for Curing Concrete
C330-09 .....	Lightweight Aggregates for Structural Concrete
C494/C494M-10 .....	Chemical Admixtures for Concrete
C618-08 .....	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
C666/C666M-03 .....	Resistance of Concrete to Rapid Freezing and Thawing
C779-00 .....	Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
C881/C881M-02 .....	Epoxy-Resin-Base Bonding Systems for Concrete
C1107/1107M-08.....	Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

- C1315-08 .....Liquid Membrane-Forming Compounds Having Special  
Properties for Curing and Sealing Concrete
- D6-95(R2006) .....Loss on Heating of Oil and Asphaltic Compounds
- D297-93(R2006) .....Rubber Products-Chemical Analysis
- D1751-04(R2008) .....Preformed Expansion Joint Filler for Concrete Paving and  
Structural Construction (Non-extruding and Resilient  
Bituminous Types)
- D 2047-04 .....Test Method for Static Coefficient of Friction of Polish-Coated  
Flooring Surfaces as Measured by the James Machine
- D4397-09 .....Polyethylene Sheeting for Construction, Industrial and  
Agricultural Applications
- D 5249-10 .....Backer Material for Use with Cold- and Hot-Applied Joint  
Sealants in Portland-Cement Concrete and Asphalt Joints
- E96-10.....Standard Test Methods for Water Vapor Transmission of  
Materials
- E1155-96(R2008) .....Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers
- E. American Welding Society (AWS):
- D1.4/D1.4M-11 .....Structural Welding Code - Reinforcing Steel
- F. Concrete Reinforcing Steel Institute (CRSI):
- Handbook 2008
- G. Federal Specifications
- RR-T-650 .....Treads, Metallic And Nonmetallic, Skid-Resistant.
- H. National Cooperative Highway Research Program (NCHRP):
- Report On.....Concrete Sealers for the Protection of Bridge Structures
- I. U. S. Department of Commerce Product Standard (PS):
- PS 1 .....Construction and Industrial Plywood
- PS 20.....American Softwood Lumber
- J. U. S. Army Corps of Engineers Handbook for Concrete and Cement:
- CRD C513.....Rubber Waterstops
- CRD C572.....Polyvinyl Chloride Waterstops

## **PART 2 - PRODUCTS:**

### **2.1 FORMS:**

- A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.
- B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.
- C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.
- D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.
- E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 KPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.
- F. Form Lining:
  - 1. Hardboard: ANSI/AHA A135.4, Class 2 with one (S1S) smooth side)
  - 2. Plywood: Grade B-B Exterior (concrete-form) not less than 6 mm (1/4 inch) thick.
  - 3. Plastic, fiberglass, or elastomeric capable of reproducing the desired pattern or texture.
- G. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

### **2.2 MATERIALS:**

- A. Portland Cement: ASTM C150 Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33.
  - 1. 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.

2. Size 67 or Size 467 may be used for footings and walls over 300 mm (12 inches) thick.
  3. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
- D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150  $\mu$ m (No. 100) sieve.
- E. Mixing Water: Fresh, clean, and potable.
- F. Admixtures:
1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
  2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
  3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
  4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
  5. Air Entraining Admixture: ASTM C260.
  6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
  7. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.
- G. Vapor Barrier: See Section 07 26 16, BELOW GRADE VAPOR BARRIER.
- H. Reinforcement:
1. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.
  2. Welded Wire Fabric: ASTM A185.
  3. Reinforcing Bars to be Welded: ASTM A706.
  4. Galvanized Reinforcing Bars: ASTM A767.
  5. Epoxy Coated Reinforcing Bars: ASTM A775.
  6. Cold Drawn Steel Wire: ASTM A82.

7. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.
8. Synthetic Fibers: Monofilament polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and  $0.9 \text{ kg/m}^3$  (1.5 lb. per cubic yard). Product shall have a UL rating.
9. Steel Fibers: ASTM A820, Type I cold drawn, high tensile steel wire for use as primary reinforcing in slab-on-grade. Minimum dosage rate  $18 \text{ kg/m}^3$  (30 lb. per cubic yard).
- I. Expansion Joint Filler: ASTM D 5249, Type 2 - Synthetic foam conforming, closed cell (non-water absorbent). Thickness: 1/2 inch (13 mm) unless indicated otherwise.
- J. Sheet Materials for Curing Concrete: ASTM C171.
- K. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye. Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.
- L. Moisture Vapor Emissions and Alkalinity Control Sealer: 100% active colorless aqueous silicate solution concrete surface treatment applied the day of the concrete pour in lieu of other curing methods for all concrete slabs receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, carpet, epoxy coatings and overlays .
  1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
  2. MVE 15-Year Warranty:
    - a. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Moisture Vapor Emissions & Alkalinity Control Sealer according to manufacturer's instruction, sealer manufacturer shall warrant the floor covering system against failure due to moisture vapor migration or moisture-born contaminates for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminates.

- M. Breathable Penetrating Sealer / Densifier: Provide a hardener-sealer that is a blend of silicate and siliconate polymers conforming to the following:
1. Breathable: Shall not significantly reduce the flow of vapor (as measured by ASTM E96) from that of uncoated concrete (or other substrate to which it is applied).
  2. Low VOC: Less than 50 g/L
  3. Increase the hardness of concrete by at least 20 percent when tested according to ASTM C779.
  4. Slip Resistance: Wet Coefficient of Friction of 0.6 or greater when tested according to ASTM D 2047 for the specified concrete finish texture.
  5. Where sealer is used over curing compound, verify that the curing compound is compatible with the sealer.
- N. Non-Shrink Grout:
1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
  2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.
- O. Adhesive Binder: ASTM C881.
- P. Waterstops: Bentonite Water Stop: Flexible strip of bentonite 25 mm x 20 mm (1 inch by 3/4 inch), weighing 8.7 kg/m (5.85 lbs. per foot) composed of Butyl Rubber Hydrocarbon (ASTM D297), Bentonite (SS-S-210-A) and Volatile Matter (ASTM D6).
- Q. Porous Backfill: Drainage Fill as described in Section 31 20 00, EARTH MOVING.
- R. Bonding Admixture: Non-rewettable, polymer modified, bonding compound.
- S. Safety Nosing for use in Concrete Stair Treads
1. Fed. Spec. RR-T-650, Type C (aluminum), Type 4 (abrasive fill).
  2. Fabricate nosings approximately 75 mm (3 inches) wide with not more than 9 mm (3/8 inch) nose.
  3. Provide nosings with integral type anchors spaced not more than 100 mm (4 inches) from each end and intermediate anchors spaced approximately 375 mm (15 inches) on center.

4. Fabricate nosings to extend within 100 mm (4 inches) of ends of concrete stair treads except where shown to extend full width.

## 2.3 CONCRETE MIXES:

- A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.
  1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
  2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per m<sup>3</sup> (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement-fly ash ratio, and consistency of each cylinder in terms of slump. Include dry unit weight of lightweight structural concrete.
  3. Prepare a curve showing relationship between water-cement -fly ash ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
  4. If the field experience method is used, submit minimum of 10 examples from the last 12 months with complete standard deviation analysis.
- B. Fly Ash Testing: Submit certificate verifying conformance with specifications initially with mix design and for each truck load of fly ash delivered from source. Notify Resident Engineer immediately when change in source is anticipated.
- C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Resident Engineer or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. Resident Engineer may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and fly ash and approval of design mix.
- D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work. Increase this replacement to 40% for mass concrete, and reduce it to 10% for drilled piers and caissons.

**TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE**

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio
35 (5000) <sup>1,3</sup>	375 (630)	0.45	385 (650)	0.40
30 (4000) <sup>1,3</sup>	325 (550)	0.55	340 (570)	0.50
25 (3000) <sup>1,3</sup>	280 (470)	0.65	290 (490)	0.55
25 (3000) <sup>1,2</sup>	300 (500)	*	310 (520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
  2. Lightweight Structural Concrete. Pump mixes may require higher cement values.
  3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
  4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.
- E. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

**TABLE II - MAXIMUM SLUMP, MM (INCHES)\***

Type of Construction	Normal Weight Concrete	Lightweight Structural Concrete
Reinforced Footings and Substructure Walls	75mm (3 inches)	75 mm (3 inches)
Slabs, Beams, Reinforced Walls, and Building Columns	100 mm (4 inches)	100 mm (4 inches)

- F. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 225 mm (9 inches). The concrete shall arrive at the job site at a slump of 50 mm to 75 mm (2 inches to 3 inches), and 75 mm to 100 mm (3 inches to 4 inches) for lightweight concrete. This should be verified,

and then the high-range-water-reducing admixture added to increase the slump to the approved level.

- G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Determine air content by either ASTM C173 or ASTM C231.

**TABLE III - TOTAL AIR CONTENT  
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Total Air Content	Coarse Aggregate, mm (Inches) Percentage by Volume
10 mm (3/8 in).6 to 10	13 mm (1/2 in).5 to 9
20 mm (3/4 in).4 to 8	25 mm (1 in).3-1/2 to 6-1/2
40 mm (1 1/2 in).3 to 6	

Note: At Contractor's option, up to 3% air content may be used in interior concrete to increase workability.

- H. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.
- I. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).
- J. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. Air content as shown in Table III.
- K. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, Resident Engineer may require any one or any combination of the following corrective actions, at no additional cost to the Government:

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, Resident Engineer may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, Resident Engineer may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.
5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Resident Engineer.

## **2.4 BATCHING AND MIXING:**

- A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by Resident Engineer. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 38°C (100 degrees Fahrenheit). Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
-1. degrees to 4.4 degrees C (30 degrees to 40 degrees F)	15.6 degrees C (60 degrees F.)
-17 degrees C to -1.1 degrees C (0 degrees to 30 degrees F.)	21 degrees C (70 degrees F.)

## **PART 3 - EXECUTION**

### **3.1 FORMWORK:**

- A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork, shores, and reshores.

1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and Resident Engineer approves their reuse.
  2. Provide forms for concrete footings unless Resident Engineer determines forms are not necessary.
  3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.
- B. Treating and Wetting: Treat or wet contact forms as follows:
1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
  2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
  3. Use sealer on reused plywood forms as specified for new material.
- C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than  $1/270$  of free span of member.
- D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.
- E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to same backing board. Nail lining at not over 200 mm (8 inches) on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.
- F. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of walls and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
  2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.
- 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 Resident Engineer. Install sleeves in beams, joists, or columns that are not shown, but are permitted by the Resident Engineer, and require no structural changes, at no additional cost to the Government.
  4. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
  5. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.
- 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 1.6 mm (16 gauge) black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
  2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 150 mm (6 inches) in slabs on grade.
  3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.
- C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.
- D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
  1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
  2. Welded splices: Splicing by butt-welding of reinforcement permitted providing the weld develops in tension at least 125 percent of the yield strength ( $f_y$ ) for the bars. Welding conform to the requirements of AWS D1.4. Welded reinforcing steel conform to the chemical analysis requirements of AWS D1.4.

- a. Submit test reports indicating the chemical analysis to establish weldability of reinforcing steel.
  - b. Submit a field quality control procedure to insure proper inspection, materials and welding procedure for welded splices.
  - c. Testing agency shall test a minimum of three splices, for compliance, locations selected by Resident Engineer.
3. Mechanical (End) 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 and wherever lap splice would compromise minimum cover. Use approved exothermic, tapered threaded coupling, or swaged and threaded sleeve. Exposed threads and swaging in the field not permitted.
- a. Initial qualification: In the presence of Resident Engineer, make three test mechanical splices of each bar size proposed to be spliced. Testing laboratory shall 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. Testing laboratory shall perform the load test.
- E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by Resident Engineer.
- F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.
- G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

### **3.3 VAPOR BARRIER:**

- A. See Section 07 26 16, BELOW GRADE VAPOR RETARDER.

### **3.4 MOISTURE VAPOR EMISSIONS & ALKALINITY CONTROL SEALER:**

- A. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, carpet, epoxy coatings and overlays.

- B. Manufacturer's representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.
  - 1. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.
  - 2. Apply at rate recommended by sealer manufacturer.
  - 3. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply Sealer product to these areas as soon as weather condition permits.
- C. Apply to all slabs on grade scheduled to receive finish flooring.

### **3.5 CONSTRUCTION JOINTS:**

- A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by Resident Engineer.
- B. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.
- C. Place concrete for columns slowly and in one operation between joints. Install joints in concrete columns at underside of deepest beam or girder framing into column.
- D. Allow 2 hours to elapse after column is cast before concrete of supported beam, girder or slab is placed. Place girders, beams, grade beams, column capitals, brackets, and haunches at the same time as slab unless otherwise shown.
- E. Install bentonite water seals, as shown in accordance with manufacturer's instructions, to form continuous watertight seal.

### **3.6 SAFETY NOSINGS**

- A. Except as specified and where preformed rubber treads are shown or specified install safety nosings at exterior concrete steps.
- B. Install flush with horizontal and vertical surfaces.
- C. Install nosing to within 100 mm (4 inches) of ends of concrete stair treads, except where shown to extend full width.

**3.7 EXPANSION JOINTS:**

- A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

**3.8 PLACING CONCRETE:**

- A. Preparation:
  - 1. Remove hardened concrete, wood chips, shavings and other debris from forms.
  - 2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
  - 3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
  - 4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.
- B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
  - 1. Preparing surface for applied topping:
    - a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
    - b. Broom clean and keep base slab wet for at least four hours before topping is applied.
    - c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.
- C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete subject to approval of Resident Engineer.
- D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.

1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
  2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
  3. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
  4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
  5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
  6. On bottom of members with severe congestion of reinforcement, deposit 25 mm (1 inch) layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.
  7. Concrete on metal deck: Concrete on metal deck shall be minimum thickness shown. Allow for deflection of steel beams and metal deck under the weight of wet concrete in calculating concrete quantities for slab.
    - a. The Contractor shall become familiar with deflection characteristics of structural frame to include proper amount of additional concrete due to beam/deck deflection.
- E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction,

complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.

1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.
3. Do not permit a vibrator to stay inserted in a single location without being move for more than 30 seconds.

### **3.9 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 Resident Engineer.

### **3.10 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, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

### **3.11 PROTECTION AND CURING:**

- A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.
  1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage  $10\text{m}^2/\text{L}$  (400 square feet per gallon) on steel troweled surfaces

and 7.5m<sup>2</sup>/L (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.

2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.
4. Other methods may be used with specific approval of the Resident Engineer.

### **3.12 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.

### **3.13 CONCRETE SURFACE PREPARATION:**

- A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

- B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.
- C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

### **3.14 CONCRETE FINISHES:**

- A. Vertical and Overhead Surface Finishes:
1. Unfinished areas: Vertical and overhead concrete surfaces exposed in pipe basements, elevator and dumbwaiter shafts, pipe spaces, pipe trenches, above suspended ceilings, manholes, and other unfinished areas will not require additional finishing.
  2. Interior and exterior exposed areas to be painted: Remove fins, burrs and similar projections on surfaces flush, and smooth by mechanical means approved by Resident Engineer, and by rubbing lightly with a fine abrasive stone or hone. Use ample water during rubbing without working up a lather of mortar or changing texture of concrete.
  3. Interior and exterior exposed areas finished: Give a grout finish of uniform color and smooth finish treated as follows:

- a. After concrete has hardened and laitance, fins and burrs removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone stone.
  - b. Apply grout composed of one part of Portland cement, one part fine sand, smaller than a 600  $\mu\text{m}$  (No. 30) sieve. Work grout into surface of concrete with cork floats or fiber brushes until all pits, and honeycombs are filled.
  - c. After grout has hardened slightly, but while still plastic, scrape grout off with a sponge rubber float and, about 1 hour later, rub concrete vigorously with burlap to remove any excess grout remaining on surfaces.
  - d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish of area in same day. Make limits of finished areas at natural breaks in wall surface. Leave no grout on concrete surface overnight.
4. Textured: Finish as specified. Maximum quantity of patched area 0.2  $\text{m}^2$  (2 square feet) in each 93  $\text{m}^2$  (1000 square feet) of textured surface.

**B. Slab Finishes:**

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.
2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.

3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.
7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense,

smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.

10. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by Resident Engineer from sample panel.
11. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
  - a. Areas covered with carpeting, or not specified otherwise in b. below:
    - 1) Slab on Grade:
 

a) Specified overall value	FF 25/FL 20
b) Minimum local value	FF 17/FL 15
    - 2) Level suspended slabs (shored until after testing) and topping slabs:
 

a) Specified overall value	FF 25/FL 20
b) Minimum local value	FF 17/FL 15
    - 3) Unshored suspended slabs:
 

a) Specified overall value	FF 25
b) Minimum local value	FF 17
    - 4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
  - b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:
    - 1) Slab on grade:
 

a) Specified overall value	FF 36/FL 20
b) Minimum local value	FF 24/FL 15
    - 2) Level suspended slabs (shored until after testing) and topping slabs
 

a) Specified overall value	FF 30/FL 20
b) Minimum local value	FF 24/FL 15
    - 3) Unshored suspended slabs:
 

a) Specified overall value	FF 30
b) Minimum local value	FF 24

- 4) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
  - c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.
  - d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.
12. Measurements
- a. Testing laboratory shall take measurements as directed by Resident Engineer, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by testing laboratory.
  - b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.
13. Acceptance/ Rejection:
- a. If individual slab section measures less than either of specified minimum local  $F_F/F_L$  numbers, that section shall be rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
  - b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall  $F_F/F_L$  numbers, then whole slab shall be rejected and remedial measures shall be required.

14. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

### **3.15 EXPOSED SURFACE TREATMENTS:**

- A. Apply breathable penetrating sealer / densifier as recommended by manufacturer.
  1. Apply at all concrete floors to be left exposed in final construction, including floor of Ambulance Garage, unless noted otherwise.
  2. Apply at all exposed concrete wall and "floors" in exterior stair wells.
- B. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Broadcast aggregate uniformly over concrete surface at rate of application of 8% per 1/10th m<sup>2</sup> (7.5 percent per square foot) of area. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water to slightly expose abrasive aggregate.

### **3.16 APPLIED TOPPING:**

- A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 200 mm (8 inches) for concrete containing a high-range water-reducing admixture (superplasticizer) and 100 mm (4 inches) for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.
- B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

--- E N D ---



**SECTION 03 41 13**  
**PRECAST CONCRETE HOLLOW CORE PLANKS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies precast concrete floor and roof planks.
- B. Designs: flat plank.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate openings sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units.
- B. Sequencing: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.
- A. Preinstallation Conference: Conduct a preinstallation meeting a minimum of two weeks prior to installation of precast concrete. Require attendance of related trades and the Architect. Review the following items:
  - 1. Review shop drawings and installation details.
  - 2. Anchor and weld plate locations.
  - 3. Opening locations including those cut in the field.
  - 4. Limitations on field cutting and core drilling.
  - 5. Site access requirements and obstructions including but not limited:
    - a. Access roads and maintenance thereof.
    - b. Protection and repair of existing paving.
    - c. Dewatering of footing trenches.
    - d. Job site snow removal.
    - e. Job site debris removal.
    - f. Overhead obstructions including power lines.
  - 6. Cold weather grouting requirements and expectations.
  - 7. Cleaning responsibilities and expectations.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide units and connections capable of withstanding: the design criteria specified on the drawings, self weights and weights of materials supported or attached, for the conditions indicated.
  - 1. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, applicable to types of units indicated.

2. Limit deflection of precast members as follows:
  - a. Limit Deflection to Span / 360.
3. Design for handling, transportation and erection stresses.
- B. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage and creep of primary building structure, and other building movements.
- C. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 72 deg C (130 deg F). Use other values, greater or smaller, whenever justified by climatic conditions at the project site.
- D. Calculated Fire-Test-Response Characteristics: Where indicated, provide units whose fire resistance has been calculated according to PCI MNL 124, and is acceptable to authorities having jurisdiction. Design for the following:
  1. Roof Assembly:
    - a. Roof to be designed as future 1 hour floor.
    - b. Area of roof adjacent to existing building and within 10 feet of the adjacent building must be designed as 1 hour separation.
  2. Floor Assembly: 1 hour.

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES .
- B. Shop (Erection) Drawings: Detail fabrication and installation of units.
  1. Indicate member locations with distinctive marks that match marks placed on the panels.
  2. Indicate details of joints, attachments and other details as required.
  3. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware, and connections.
  4. Indicate locations, tolerances and details of anchorage devices to be embedded in or attached to structure or other construction.
  5. Indicate sequence of erection.
  6. Indicate locations and details of facing materials, anchors, and joint widths.
  7. Design Modifications:
    - a. If design modifications are necessary to meet the performance requirements and field conditions, submit design calculations and drawings. Do not

adversely affect the appearance, durability or strength of units when modifying details or materials and maintain the general design concept.

- C. Comprehensive Engineering Analysis: Provide calculations signed and sealed by the qualified professional engineer responsible for the product design. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate design criteria and loads. Indicate the location, type, magnitude and direction of all imposed loadings from the precast system to the building structural frame.
- D. Manufacturers Certificates: Stating plank conforms to specification requirements. Include test reports where appropriate.

## **1.5 QUALITY ASSURANCE**

- A. A Comprehensive Engineering Analysis shall be performed by a structural engineer licensed in Iowa and who is experienced in providing engineering services of the kind indicated.
- B. Manufacturer/Plant:
  - 1. Participates in PCI's Plant Certification program at the time of bidding and is designated a PCI-certified plant for Group C2 or Group C2A.
  - 2. Assumes responsibility for engineering units to comply with performance requirements.
  - 3. Has sufficient production capacity to produce required units without delaying the work.
- C. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."
  - 1. Comply with camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."
- D. Erector Qualifications:
  - 1. An erector with a minimum of 5 years of experience who has completed structural precast concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Qualify procedures and personnel according to AWS

D1.1/D1.1M, “Structural Welding Code – Steel”; and AWS D1.4, “Structural Welding Code – Reinforcing Steel.”

- F. Mark each member with date of production and final position in structure.

## **1.6 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Product handling requirements of PCI MNL 135 shall be followed at the plant and project site. Conform to manufacturer’s recommendations.
- B. Deliver all units to the project site in such quantities and at such times to assure compliance with the agreed project schedule and proper setting sequence so as to limit unloading units temporarily on the ground.
- C. Lift and support units only at designated points shown on the Shop Drawings. Lifting devices to have a minimum safety factor of 5 to 1.
- D. Storage and Support: At all times store and support units off ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Do not use stacked precast units for storage of other units or equipment.
- E. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

## **1.7 WARRANTY**

- A. Warranty of precast concrete work, including anchorage, joint treatment and related components to be free from defects in materials and workmanship, including cracking and spalling.

## **1.8 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of specification to extent referenced. Publications are referred to in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A36-04 .....Structural Steel
  - A185-02 .....Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
  - A653/A653M-04.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy  
Coated (Galvannealed) by the Hot-Dip Process
  - A615/A615M-04.....Deformed and Plain Billet-Steel Bars for Concrete  
Reinforcement

- A996/A996M-04.....Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
- C144-04 .....Aggregates for Masonry Mortar
- C150-04 .....Portland Cement
- C494-04 .....Chemical Admixtures for Concrete
- C881-02 .....Epoxy-Resin-Base Bonding Systems for Concrete
- C. Precast Concrete Institute (PCI)  
(CERT) .....PCI Plant Certification; Precast/Prestressed Concrete Institute; online at [www.pci.org](http://www.pci.org).
- MNL-116 .....Manual for Quality Control for Plants and Production of Structural Precast Concrete Products; Precast/Prestressed Concrete Institute.
- MNL-120 .....PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute.
- MNL-123 .....Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute.
- MNL-124 .....Design for Fire Resistance of Precast Prestressed Concrete; Precast/Prestressed Concrete Institute.
- MNL-126 .....Manual For The Design of Hollow Core Slabs; Precast/Prestressed Concrete Institute.
- MNL-135 .....Tolerance Manual for Precast and Prestressed Concrete Construction

## **PART 2 - PRODUCTS**

### **2.1 DESIGN**

- A. Precast Hollow Core Planks: Comply with PCI MNL-120, PCI MNL 126, PCI MNL-124, ACI 318, and ACI 301.
- B. Design connections in accordance with PCI MNL-123.
- C. Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

### **2.2 REINFORCING MATERIALS**

- A. Reinforcing Steel: Reinforcing steel or mesh will be selected from the following materials to conform to precaster's design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded without specific approval of Architect/Engineer.

1. Reinforcing Steel: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
  2. Alloy Steel: ASTM A706/A706M, deformed.
  3. Steel Bar Mats: ASTM A184/A184M, assembled with clips.
  4. Plain-Steel Welded Wire Reinforcement: ASTM A185, fabricated steel wire into flat sheets.
  5. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.
- B. Epoxy-Coated-Steel Welded Wire Reinforcement: ASTM A884/A884M Class A coated, plain on flat sheet, Type 1 bendable coating.
- C. Prestressing Strand: ASTM A416/A416M, Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.
- D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or III, standard gray.
- B. Supplementary Cementitious Materials for unexposed surfaces (backup concrete) only.
1. Fly Ash Admixture: ASTM C618, Class C or F with maximum loss on ignition of 3 percent.
  2. Metakaolin Admixture: ASTM C618, Class N.
  3. Silica Fume Admixture: ASTM C1240 with optional chemical and physical requirement.
  4. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33, with coarse aggregates complying with Class 5S with 0% iron oxides.
- D. Admixtures: Admixtures containing calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture are not permitted.
1. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
  2. Water reducing, retarding, accelerating admixtures: ASTM C494.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete.

## 2.4 ANCHORS AND INSERTS

- A. Carbon-Steel Shapes and Plates: ASTM A36/A36M except silicon (Si) content in the range of 0 to 0.03% or 0.15 to 0.25% for materials to be galvanized. Steel with chemistry conforming to the formula  $Si + 2.5P \leq 0.09$  is also acceptable.
- B. Carbon-Steel Headed Studs: ASTM A108, Grades 1018 through 1020, cold finished and bearing the minimum mechanical properties for studs as indicated under PCI MNL 117, Table 3.2.3.; AWS D1.1, Type A or B, with arc shields.
- C. Carbon-Steel Plate: ASTM A283/A283M.
- D. Malleable Iron Castings: ASTM A47/A47M. Grade 32510.
- E. Carbon-Steel Castings: ASTM A27/A27M, Grade U-60-30 (Grade 415-205).
- F. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M except silicon (Si) content in the range of 0 to 0.03% or 0.15 to 0.25% for materials to be galvanized. Steel with chemistry conforming to the formula  $Si + 2.5P \leq 0.09$  is also acceptable.
- G. Carbon-Steel Structural Tubing: ASTM A500, Grade B.
- H. Wrought Carbon-Steel Bars: ASTM A675/A675M, Grade 65 (Grade 450).
- I. Deformed-Steel Wire or Bar Anchors: ASTM A496 or ASTM A706/A706M.
- J. Carbon-Steel Bolts and Studs: ASTM A307, Grade A (ASTM F568M, Property Class 4.6) carbon-steel, hex-head bolts and studs; carbon-steel nuts (ASTM A563/A563M, Grade A); and flat, unhardened steel washers (ASTM F844).
- K. High-Strength Bolts and Nuts: ASTM A325/A325M or ASTM A490/A490M, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, (ASTM A563/A563M) and hardened carbon-steel washers (ASTM F436/F436M).
- L. Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123/A123M, after fabrication, or ASTM A153/A153M, as applicable.
  - 1. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint 20.
- M. Stainless Steel: ASTM A666, type 304.
- N. Welding Electrodes and Other Welding Materials: Comply with AWS standards.

## 2.5 ACCESSORIES

- A. Bearing Pads: Manufacturer's stand conforming to the following:
  - 1. The PCI Design Handbook, Second Edition, Part 5.1 through Part 5.5 shall be used for the design of bearing pads.

2. Unless otherwise noted, Elastomeric Bearing Pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used.
  3. Hardness: Minimum 50 to 70 Shore A durometer according to ASTM D2240
  4. Non-staining, nonleaching.
  5. Capable of supporting the 150% of the anticipated load with no cracking, splitting or delaminating in the internal portions of the pad.
- B. Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install units.
1. Provide zinc-coated steel clips for plank to secure plank to framing.

## 2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland Cement, ASTM C150, Type I, and clean, natural sand, ASTM C144, or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, Grade A for drypack and Grades B and C for flowable grout and of a consistency suitable for application within a 30-minute working time.
- C. Epoxy-resin grout: Two-component mineral-filled epoxy-resin: ASTM C881 of type, grade, and class to suit requirements.

## 2.7 FABRICATION

- A. Produce planks in accordance with requirements of PCI MNL-116. Maintain plant records and quality control program during production of precast planks. Make records available upon request.
- B. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- C. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing units to supporting and adjacent construction.

- D. Cast-in reglets, slots, holes, and other accessories in units as indicated.
- E. Cast-in openings larger than 250 mm (10 inches) in any dimension. Do not drill or cut openings or reinforcing without approval of Resident Engineer.
- F. Reinforcement:
  - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
  - 2. Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Completely conceal plastic tipped or corrosion resistant metal or plastic chair support devices to prevent exposure on finished surfaces.
  - 3. Place reinforcing steel and prestressing strand to maintain at least 19 mm (3/4 inch) minimum concrete cover. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete.
  - 4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
  - 5. Reinforce architectural precast concrete units to resist handling, transportation and erection stresses, and specified in-place loads, whichever governs.
  - 6. Prestress tendons for units by pretensioning methods. Comply with PCI MNL 117.
    - a. Protect strand ends and anchorages to prevent corrosion and rust spots.
- G. Inspect stressing tendons before delivery for compliance with specified standards.
- H. Not acceptable: Warped, cracked or broken units.
- I. Allowable Tolerances: In accordance with MNL-116 and MNL-135 and as follows
  - 1. Thickness and depth 3 mm, (1/8 inch).
  - 2. Length and width 6 mm (1/4 inch).
  - 3. Width: Plus or minus 1/8 inch for items 48 inch or less; 1/4 inch for items 48 to 120 inches, and 1/2 inches maximum for items over 120 inches and more.
  - 4. Camber or Sweep:
    - a. Plus or minus 6 mm (1/4-inch) for every 10 feet in length or 1/2 inch, whichever is greater.
    - b. Variation in camber between adjacent and abutting members, 3 mm (1/8 inch).

5. Inserts, bolts and pipe sleeves: Deviation from location shown - not more than 10 mm (3/8 inch).

J. Planks:

1. Shapes: tongue and grooved flat plank as shown.
2. Roof planks suitable for fully adhered roofing system.
3. Manufacture: Reinforced concrete, composed of regular weight mineral aggregate, portland cement and water, resulting in a unit having a minimum compressive strength of 24000 MPa (3500 psi) for structural (non-nailable) slabs.
4. Finish: Commercial Grade (PCI) - : This is essentially a "as-cast" finish.
  - a. Concrete may be produced in forms that impart a texture to the concrete, (e.g. plywood lumber or steel forms with offset joints, dents, or holes).
  - b. The surface may contain air holes (bug holes) and water marks, and there may be some minor chips and spalls. There may be patches and streaks of color variation within the surface, and the overall color tone may vary between pieces.
  - c. Large fins from joint bleeding should be removed, but small fins may remain. Only "honeycombed" and/or badly spalled areas should be repaired or finished. All faces should have true, well-defined surfaces. The maximum allowable form joint offset should be limited to 3/16 inch.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify supporting structure is ready to receive work.

### **3.2 PREPARATION**

- A. Prepare support devices for the erection procedure and temporary bracing.
- B. Before erection of slabs, clean bearing surfaces free from dirt, mortar particles, and trash.

### **3.3 INSTALLATION**

- A. Install slabs in accordance with manufacturer's instructions.
- B. Erect slabs to prevent chipping and cracking and to provide a level deck surface.
  1. Stagger end joints
  2. Locate end joints on centerline of support.
- C. Secure units in place. Perform welding in accordance with AWS D1.1.
- D. Grout longitudinal keys as indicated.
  1. After erection, fill as indicated in approved design.

2. Finish joint flush.
- E. Do not make cutouts without approval of Resident Engineer.
  1. Form openings or carefully saw cut; do not punch openings.
  2. Locate openings less than 150 mm (6-inches) wide in sections of plank between reinforcing.
  3. Frame openings larger than 150 mm (6-inches) wide with structural steel headers.
- F. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135.

### **3.4 REPLACEMENT AND REPAIR**

- A. Replace broken, cracked, and warped plank, and planks exceeding allowable tolerances.
- B. Plank having defects, not affecting serviceability of deck, may be repaired with epoxy grout if approved by Resident Engineer.

--- E N D ---



**SECTION 03 45 00**  
**PRECAST ARCHITECTURAL CONCRETE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section includes the performance criteria, materials, production, and erection of architectural precast concrete cladding units. The work performed under this section includes all labor, material, equipment, related services, and supervision required for the manufacture and erection of the architectural precast concrete work shown on the contract drawings.

**1.2 RELATED WORK**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Concrete: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- C. Mortar: Section 04 05 11, MASONRY MORTARING AND GROUTING
- D. Insulation for Insulated Panels: Section 07 21 13, THERMAL INSULATION.
- E. Sealants and Caulking: Section 07 92 00, JOINT SEALANTS.
- F. Size, type and color of aggregate for exposed aggregate finish and matrix color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate openings sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units.
- B. Sequencing: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.
- A. Preinstallation Conference: Conduct a preinstallation meeting a minimum of two weeks prior to installation of precast concrete. Require attendance of related trades and the Architect. Review the following items:
  - 1. Review shop drawings and installation details.
  - 2. Anchor and weld plate locations.
  - 3. Opening locations including those cut in the field.
  - 4. Limitations on field cutting and core drilling.
  - 5. Site access requirements and obstructions including but not limited:
    - a. Access roads and maintenance thereof.
    - b. Protection and repair of existing paving.

- c. Dewatering of footing trenches.
- d. Job site snow removal.
- e. Job site debris removal.
- f. Overhead obstructions including power lines.
- 6. Cold weather grouting requirements and expectations.
- 7. Cleaning responsibilities and expectations.

#### **1.4 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide units and connections capable of withstanding: the design criteria specified on the drawings, self weights and weights of materials supported or attached, for the conditions indicated.
  - 1. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, applicable to types of units indicated.
  - 2. Limit deflection of precast members as follows:
    - a. Vertical live load –  $\text{Span} / 360$ .
    - b. Wind load – Floor to floor height times 0.0025.
  - 3. Design for handling, transportation and erection stresses.
- B. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage and creep of primary building structure, and other building movements.
- C. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 72 deg C (130 deg F). Use other values, greater or smaller, whenever justified by climatic conditions at the project site.
- D. Thermal Performance:
  - 1. Minimum R-Value = 15.
  - 2. Insulation shall be continuous through joints. No solid zones or uninsulated panels permitted. Limited reduced insulation zones will be permitted as long as the overall average R-Value is maintained.
- E. Calculated Fire-Test-Response Characteristics: Where indicated, provide units whose fire resistance has been calculated according to PCI MNL 124, and is acceptable to authorities having jurisdiction.

#### **1.5 SUBMITTALS**

- A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for 5 years or period of warranty, whichever is greater.

- B. Design Mixes: For each concrete mix along with compressive strength and water-absorption tests.
- C. Shop Drawings: Detail fabrication and installation of units.
  - 1. Provide details showing panel construction, cross sections, corner details, shapes, and other details as required to describe the proposed panels.
  - 2. Indicate member locations with distinctive marks that match marks placed on the panels. Provide plans, elevations, dimensions, and relationships to adjacent materials.
  - 3. Indicate aesthetic intent including joints, reveals, and extent and location of each surface finish.
  - 4. Indicate separate face and backup mix locations, and thicknesses. Indicate locations, extent and treatment of dry joints if two-stage casting is proposed.
  - 5. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware, and connections.
  - 6. Indicate locations, tolerances and details of anchorage devices to be embedded in or attached to structure or other construction.
  - 7. Indicate sequence of erection.
  - 8. Indicate locations and details of facing materials, anchors, and joint widths.
  - 9. Design Modifications:
    - a. If design modifications are necessary to meet the performance requirements and field conditions, submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials and maintain the general design concept.
- D. Comprehensive Engineering Analysis: Provide calculations signed and sealed by the qualified professional engineer responsible for the product design. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate design criteria and loads. Indicate the location, type, magnitude and direction of all imposed loadings from the precast system to the building structural frame.
- E. Samples: Design reference samples for initial verification of design intent, approximately 300 by 300 by 50 mm (12 by 12 by 2 inches), representative of finishes, color, and textures of exposed surfaces of units. Obtain approval of sample before proceeding with the preparation of mockup.
- F. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel.

- G. Qualification Data for fabricator and professional engineer: List of completed projects with project names and addresses, names and addresses of Resident Engineers and owners, and other information specified.
- H. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
  - 1. Concrete strengths and mix designs.
- I. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
  - 1. Concrete materials.
  - 2. Reinforcing materials and prestressing tendons.
  - 3. Admixtures.
  - 4. Bearing pads.
  - 5. Structural-steel shapes and hollow structural sections.
  - 6. Insulation
  - 7. Facing units.
  - 8. Anchors.
- J. Mockups: After sample approval but before production of units, construct mockup of 1220 x 1220 mm (4 x 4 feet) to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Mockup to be representative of the finished work in all respects including thin brick, cast stone copings, variations in plane, sealants and architectural precast concrete complete with all insulation, anchors, connections, flashings, and joint fillers as accepted on the final shop drawings. Build mockups to comply with the following requirements, using materials indicated for the completed work:
  - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Resident Engineer.
  - 2. Notify Resident Engineer in advance of dates and times when mockups will be constructed.
  - 3. Obtain Resident Engineer's approval of mockups before starting fabrication.
  - 4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 5. Demolish and remove mockups when directed.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that complies with PCI MNL 117 and the following requirements and is experienced in producing units similar to those indicated for this Project and with a record of successful in-service performance:
  - 1. Assumes responsibility for engineering units to comply with performance requirements.
  - 2. A Comprehensive Engineering Analysis shall be performed by a structural engineer licensed in Iowa and who is experienced in providing engineering services of the kind indicated.
  - 3. Participates in PCI's Plant Certification program at the time of bidding and is designated a PCI-certified plant for Group A, Category A1- Architectural Cladding and Load Bearing Units.
  - 4. Has sufficient production capacity to produce required units without delaying the work.
- B. Erector Qualifications: Shall meet one of the following qualifications:
  - 1. A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the project site. Submit a current Certificate of Compliance furnished by PCI designating qualification in Category A (Architectural Systems) for non-load-bearing members and having minimum 5 years of experience.
  - 2. An erector with a minimum of 5 years of experience who has completed architectural precast concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance and who meets the following requirements:
    - a. Retains a PCI Certified Field Auditor, at erector's expense, to conduct a field audit of a project in the same category as this Project prior to start of erection. Submits Erectors Post Audit Declaration.
    - b. The basis of the audit is the PCI MNL 127.
- C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117.
- D. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Qualify procedures and personnel according to AWS

D1.1/D1.1M, “Structural Welding Code – Steel”; and AWS D1.4, “Structural Welding Code – Reinforcing Steel.”

- E. Mark each member with date of production and final position in structure.

## **1.7 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Product handling requirements of PCI MNL 117 shall be followed at the plant and project site. Conform to manufacturer’s recommendations.
- B. Deliver all units to the project site in such quantities and at such times to assure compliance with the agreed project schedule and proper setting sequence so as to limit unloading units temporarily on the ground.
- C. Lift and support units only at designated points shown on the Shop Drawings. Lifting devices to have a minimum safety factor of 5 to 1.
- D. Storage and Support: At all times store and support units off ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Do not use stacked precast units for storage of other units or equipment.
- E. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

## **1.8 WARRANTY**

- A. Warranty of precast concrete work, including anchorage, joint treatment and related components to be free from defects in materials and workmanship, including cracking and spalling.
- B. After erection, completed work will be weathertight, subject to terms of Article “Warranty of Construction” FAR clause 52.246-21, except warranty period is extended to five years.

## **1.9 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):
  - A27/A27M-03 .....Steel Castings, Carbon, for General Application
  - A36/A36M-04 .....Carbon Structural Steel
  - A47/A47M-99 .....Ferritic Malleable Iron Castings
  - A82-02.....Steel Wire, Plain, for Concrete Reinforcement
  - A108-03.....Steel Bar, Carbon and Alloy, Cold-Finished

A123/A123M-02 .....	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M-03 .....	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A167-99 .....	Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A184/A184M-01 .....	Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
A185-02 .....	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A276-04 .....	Stainless Steel Bars and Shapes
A283/A283M-03 .....	Low and Intermediate Tensile Strength Carbon Steel Plates
A307-03 .....	Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
A325/A325M-04 .....	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A416/A416M-02 .....	Steel strand, Uncoated Seven-Wire for Prestressed Concrete
A490/A490M-04 .....	Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
A496-02 .....	Steel Wire, Deformed, for Concrete Reinforcement
A497-02 .....	Steel Welded Wire Reinforcement, Deformed, for Concrete
A500-03a .....	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A563/A563M-04 .....	Carbon and Alloy Steel Nuts
A572/A572M-04 .....	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A615/A615M-04a .....	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A666-03 .....	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
A675/A675M-03 .....	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
A706/A706M-04a .....	Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A767/A767M-00b .....	Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
A775/A775M-04 .....	Epoxy-Coated Steel Reinforcing Bars

A780-01 .....	Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
A884/A884M-02 .....	Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement
A934/A934M-04 .....	Epoxy-Coated Prefabricated Steel Reinforcing Bars
B227-04 .....	Hard-Drawn Copper-Clad Steel Wire
B633-98e1 .....	Electrodeposited Coatings of Zinc on Iron and Steel
C33-03 .....	Concrete Aggregates
C40-04 .....	Organic Impurities in Fine Aggregate for Concrete
C150-04 .....	Portland Cement
C260-01 .....	Air-Entraining Admixtures for Concrete
C330-04 .....	Lightweight Aggregates for Structural Concrete
C373-88(99) .....	Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
C494/C494M-01 .....	Chemical Admixtures for Concrete
C618-03 .....	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
C881/C881M-02 .....	for Epoxy-Resin-Base Bonding Systems for Concrete
C979-99 .....	Pigments for Integrally Colored Concrete
C989-04 .....	Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
C1017/C1017M-03 .....	Chemical Admixtures for Use in Producing Flowing Concrete
C1107-02 .....	Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
C1218/C1218M-99 .....	Test Method for Water-Soluble Chloride in Mortar and Concrete
C1240-04 .....	Silica Fume Used in Cementitious Mixtures
D412-98(02)e1 .....	Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
D2240-03 .....	Test Method for Rubber Property—Durometer Hardness
F436/F436M-03 .....	Hardened Steel Washers
F568M-02 .....	Carbon and Alloy Steel Externally Threaded Metric Fasteners
F593-02(04)e1 .....	Stainless Steel Bolts, Hex Cap Screws, and Studs
F844-00 .....	Washers, Steel, Plain (Flat), Unhardened for General Use

- C. American Concrete Institute (ACI):
  - ACI 211.1-91 .....Selecting Proportions for Normal, Heavyweight and Mass Concrete (Reapproved 2002)
  - ACI 318/318M-02 (318R/318RM-02)Building Code Requirements for Structural Concrete
- D. American Association of State Highway and Transportation Officials
  - AASHTO LFRD-2004 .....LRFD Bridge Design Specifications, U.S., 3rd Edition
  - AASHTO M251-97(R2001)Elastomeric Bearings
- E. Precast/Prestressed Concrete Institute (PCI):
  - MNL-117-96 .....Quality Control for Plants and Production of Architectural Precast Concrete Products
  - MNL-120-99 .....Design Handbook – Precast and Prestressed Concrete
  - MNL-124-89 .....Design for Fire Resistance of Precast Prestressed Concrete.
  - MNL-127-99 .....Erector’s Manual - Standards and Guidelines for the Erection of Precast Concrete Products
  - MNL-135-00 .....Tolerance Manual for Precast and Prestressed Concrete Construction
  - TR-6-03 .....Interim Guidelines for the Use of Self-Consolidating Concrete
- F. Military Specifications (MIL. Spec):
  - MIL-C882E-89 .....Cloth, Duck, Cotton or Cotton-Polyester Blend Synthetic Rubber, Impregnated, and Laminated, Oil Resistant.
- G. Structural Steel Painting Council (SSPC):
  - SSPC-Paint 20 (2002) .....Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic).

## **PART 2 - PRODUCTS**

### **2.1 MOLD MATERIALS**

- A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; non-reactive with concrete and suitable for producing required finishes:
  - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Provide solid backing and form supports to ensure that form liners remain in place during concrete placement. Use with manufacturer’s recommended liquid-release agent that will

not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

## **2.2 REINFORCING MATERIALS**

- A. Reinforcing Steel: Reinforcing steel or mesh will be selected from the following materials to conform to precaster's design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded without specific approval of Architect/Engineer.
  - 1. Reinforcing Steel: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
  - 2. Alloy Steel: ASTM A706/A706M, deformed.
  - 3. Steel Bar Mats: ASTM A184/A184M, assembled with clips.
  - 4. Plain-Steel Welded Wire Reinforcement: ASTM A185, fabricated from steel wire into flat sheets.
  - 5. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.
- B. Epoxy-Coated-Steel Welded Wire Reinforcement: ASTM A884/A884M Class A coated, plain on flat sheet, Type 1 bendable coating.
- C. Prestressing Strand: ASTM A416/A416M, Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.
- D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

## **2.3 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C150, Type I or III, standard gray.
- B. Supplementary Cementitious Materials for unexposed surfaces (backup concrete) only.
  - 1. Fly Ash Admixture: ASTM C618, Class C or F with maximum loss on ignition of 3 percent.
  - 2. Metakaolin Admixture: ASTM C618, Class N.
  - 3. Silica Fume Admixture: ASTM C1240 with optional chemical and physical requirement.
  - 4. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33, with coarse aggregates complying with Class 5S with 0% iron oxides.
- D. Admixtures: Admixtures containing calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture are not permitted.

1. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
2. Water reducing, retarding, accelerating admixtures: ASTM C494.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- F. Coloring Materials: Where indicated, provide either integral color or permanent stain to achieve the color selected by the architect for exposed concrete.
  1. Coloring Admixture: ASTM C979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable and non-fading.
  2. Stain: UV stable and designed for use as a permanent, exterior stain.

## 2.4 ANCHORS AND INSERTS

- A. Carbon-Steel Shapes and Plates: ASTM A36/A36M except silicon (Si) content in the range of 0 to 0.03% or 0.15 to 0.25% for materials to be galvanized. Steel with chemistry conforming to the formula  $Si + 2.5P \leq 0.09$  is also acceptable.
- B. Carbon-Steel Headed Studs: ASTM A108, Grades 1018 through 1020, cold finished and bearing the minimum mechanical properties for studs as indicated under PCI MNL 117, Table 3.2.3.; AWS D1.1, Type A or B, with arc shields.
- C. Carbon-Steel Plate: ASTM A283/A283M.
- D. Malleable Iron Castings: ASTM A47/A47M. Grade 32510.
- E. Carbon-Steel Castings: ASTM A27/A27M, Grade U-60-30 (Grade 415-205).
- F. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M except silicon (Si) content in the range of 0 to 0.03% or 0.15 to 0.25% for materials to be galvanized. Steel with chemistry conforming to the formula  $Si + 2.5P \leq 0.09$  is also acceptable.
- G. Carbon-Steel Structural Tubing: ASTM A500, Grade B.
- H. Wrought Carbon-Steel Bars: ASTM A675/A675M, Grade 65 (Grade 450).
- I. Deformed-Steel Wire or Bar Anchors: ASTM A496 or ASTM A706/A706M.
- J. Carbon-Steel Bolts and Studs: ASTM A307, Grade A (ASTM F568M, Property Class 4.6) carbon-steel, hex-head bolts and studs; carbon-steel nuts (ASTM A563/A563M, Grade A); and flat, unhardened steel washers (ASTM F844).
- K. High-Strength Bolts and Nuts: ASTM A325/A325M or ASTM A490/A490M, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, (ASTM A563/A563M) and hardened carbon-steel washers (ASTM F436/F436M).

- L. Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123/A123M, after fabrication, or ASTM A153/A153M, as applicable.
  - 1. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint 20.
- M. Stainless Steel: ASTM A666, type 304.
- N. Welding Electrodes: Comply with AWS standards.

## 2.5 ACCESSORIES

- A. Bearing Pads: Manufacturer's stand conforming to the following:
  - 1. Elastomeric Bearing Pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used.
  - 2. The PCI Design Handbook, Second Edition, Part 5.1 through Part 5.5 shall be used for the design of bearing pads.
    - 1. Hardness: Minimum 50 to 70 Shore A durometer according to ASTM D2240
    - 2. Non-staining, nonleaching.
    - 3. Capable of supporting the 150% of the anticipated load with no cracking, splitting or delaminating in the internal portions of the pad.
- B. Reglets: Stainless steel, ASTM A167, Type 302 felt or fiber filled or cover face opening of slots.
- C. Vents and Weeps: Polyvinyl chloride plastic tubing, 9.5 mm (3/8-inch) inside diameter.
- A. Epoxy Anchor Hole Filler: ASTM C881, 100 percent solids, sand-filled non-shrinking, non-staining of type, class, and grade to suit application.
- B. Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install units.

## 2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland Cement, ASTM C150, Type I, and clean, natural sand, ASTM C144, or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, Grade A for drypack and Grades B and C for flowable grout and of a consistency suitable for application within a 30-minute working time.

- C. Epoxy-resin grout: Two-component mineral-filled epoxy-resin: ASTM C881 of type, grade, and class to suit requirements.

## 2.7 CLAY PRODUCT UNITS AND ACCESSORIES

- A. Thin Brick Units: Thickness, not less than 1/2 in. (12.7 mm), nor more than 1 in. (25.4 mm) thick, with an overall tolerance of plus 0 in., minus 1/16 in. (+0 mm, -1.59 mm) for any unit dimension 8 in. (203.2 mm) or less and an overall tolerance of plus 0 in., minus 3/32 in. (+0 mm, -2.38 mm) for any unit dimension greater than 8 in. (203.2 mm) measured according to ASTM C 67.
  - 1. Face Size: Modular, 2 1/4 in. (57.15 mm) high by 7 5/8 in. (193.68 mm) long.
  - 2. Face Size, Color, and Texture: Match existing building brick.
  - 3. Special Shapes: Include corners, edge corners, and end edge corners.
  - 4. Cold Water Absorption at 24 Hours: Maximum 6 percent when tested per ASTM C 67.
  - 5. Efflorescence: Tested according to ASTM C 67 and rated "not effloresced."
  - 6. Out of Square: Plus or minus 1/16 in. ( $\pm$  1.59 mm) measured to nearest 1/32 in. (1mm) according to ASTM C 67.
  - 7. Warpage: Consistent plane of plus 0 in., minus 1/16 in. (+0 mm, -1.59 mm) measured to nearest 1/32 in. (1mm).
  - 8. Variation of Shape from Specified Angle: Plus or minus 1 degree measured to nearest 1 degree using a protractor graduated in 1/2 degree (30 minute) divisions.
  - 9. Tensile Bond Strength: Not less than 150 psi (1.0MPa) when tested per modified ASTM E 488. Epoxy steel plate with welded rod on a single brick face for each test.
  - 10. Freezing and Thawing Resistance: No detectable deterioration (spalling, cracking, or chafing) when tested in accordance with ASTM C 666/ASTM C 666M.
  - 11. Modulus of Rupture: Not less than 250 psi (1.7MPa) when tested in accordance with ASTM C 67.
  - 12. Chemical Resistance: Provide brick that has been tested according to modified ASTM C 650 and rated "not affected."
  - 13. Surface Coloring: Brick with surface coloring other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in applied finish when viewed from 20 ft (6 m).
  - 14. Back Surface Texture: scored, combed, wire roughened, ribbed, keybacked, or dovetailed.

- B. Color: Provide a blend matching the following:
  1. Glen-Gery Brick, Red Colonial Modular Brick – 60 Percent
  2. Glen-Gery Brick, Maroon Colonial Modular Brick – 20 Percent
  3. Glen-Gery Brick, Terra Cotta Colonia Modular Brick – 20 Percent

## **2.8 INSULATED PANEL ACCESSORIES**

- A. Expanded-Polystyrene Board Insulation: ASTM C 578 of one of the following types: Type XI, 0.70 lb/ft<sup>3</sup>(12kg/m<sup>3</sup>), I, 0.90 lb/ft<sup>3</sup> (15kg/m<sup>3</sup>), VIII, 1.15 lb/ft<sup>3</sup>(18kg/m<sup>3</sup>), II, 1.35 lb/ft<sup>3</sup>(22kg/m<sup>3</sup>), or IX, 1.80 lb/ft<sup>3</sup>(29 kg/m<sup>3</sup>).
- B. Extruded-Polystyrene Board Insulation: ASTM C 578, of one of the following types: X, 1.30 lb/ft<sup>3</sup>(21kg/m<sup>3</sup>) or IV, 1.55 lb/ft<sup>3</sup>(25 kg/m<sup>3</sup>).
- C. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation complying with ASTM C 591; Grade 1, or ASTM C 1289 of one of the following types: I, 1.8 lb/ft<sup>3</sup>(29kg/m<sup>3</sup>), II, 2.5 lb/ft<sup>3</sup>(40kg/m<sup>3</sup>), or(III, 3.0 lb/ft<sup>3</sup>(48kg/m<sup>3</sup>).
- D. Wythe Connectors: Shall be one of the following specifically manufactured to connect wythes of precast concrete panels:
  1. Glass-fiber and vinyl-ester polymer connectors
  2. Polypropylene pin connectors
  3. Stainless-steel pin connectors
  4. Use the same connectors throughout the entire project.

## **2.9 CONCRETE MIXES**

- A. Prepare design mixes to match Resident Engineer's sample for each type of concrete required.
  1. Limit use of fly ash and granulated blast-furnace slag to 20 percent replacement of Portland cement by weight, metakaolin and silica fume to 10 percent of Portland cement by weight.
- B. Design mixes shall be prepared by a qualified independent testing agency or by qualified precast plant personnel at fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested in accordance with ASTM C1218/C1218M.
- D. Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 34.5 MPa (5000 psi).
  2. Maximum Water-Cementitious Materials Ratio: 0.45.
  3. Release Strength at Transfer of Prestress: 24.1 MPa (3500 psi).
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.

## **2.10 MOLD FABRICATION**

- A. Molds: Accurately construct and maintain molds, mortar tight, within fabrication tolerances and of sufficient strength to withstand pressures due to concrete-placement and vibration operations and temperature changes and for prestressing and detensioning operations.
1. Form joints are not permitted on faces exposed to view in the finished work.
  2. Edge and Corner Treatment: Uniformly square edge (to match brick)
  3. Coat contact surfaces of molds with release agent before reinforcement is placed.
- Avoid contamination of reinforcement and prestressing tendons by release agent.

## **2.11 SETTING FACING UNITS**

- A. Place form liner templates accurately to provide grid for brick facings. Provide solid backing and supports to maintain stability of liners while placing bricks and during placing of concrete.
- B. Joints: Formed by the concrete pour to match the existing building (tooled concave).
- C. Match appearance of sample units.
- D. Securely place brick units face down into form liner pockets and place precast concrete backing mix.
- E. After stripping units, clean faces and joints of brick facing.

## **2.12 FABRICATION**

- A. Fabricate units in accordance with MNL-116, MNL-117, MNL-135.
- B. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- C. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing units to supporting and adjacent construction.
- D. Cast-in reglets, slots, holes, and other accessories in units as indicated.
- E. Cast-in openings larger than 250 mm (10 inches) in any dimension. Do not drill or cut openings or reinforcing without approval of Resident Engineer.
- F. Reinforcement: Comply with recommendations in PCI MNL 117 for fabrication, placing, and supporting reinforcement.
  1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
  2. Accurately position, support, and secure reinforcement against displacement during concrete- placement and consolidation operations. Completely conceal plastic tipped or corrosion resistant metal or plastic chair support devices to prevent exposure on finished surfaces.
  3. Place reinforcing steel and prestressing strand to maintain at least 19 mm (3/4 inch) minimum concrete cover. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete.
  4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
  5. Reinforce architectural precast concrete units to resist handling, transportation and erection stresses, and specified in-place loads, whichever governs.
  6. Prestress tendons for units by pretensioning methods. Comply with PCI MNL 117.
    - a. Protect strand ends and anchorages to prevent corrosion and rust spots.
- G. Mix concrete according to PCI MNL 117 and requirements in this Section. After concrete batching, no additional water may be added.
  1. At the fabricator's option either of the following mix design/casting techniques may be used:
    - a. A single design mix throughout the entire thickness of panel.

- b. Design mixes for facing and backup; using cement and aggregates for each type as indicated, for consecutive placement in the mold. Use cement and aggregate specified for facing mix, use cement and aggregate for backup mix complying with criteria specified as selected by the fabricator.
- H. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units. Comply with requirements in PCI MNL 117.
  - 1. Place backup concrete to ensure bond with face mix concrete.
- I. Place face mixture to a minimum thickness after consolidation of the greater of 1 in. (25 mm) or 1.5 times the nominal maximum aggregate size, but not less than the minimum reinforcing cover as indicated on Contract Drawings.
- J. Identify pickup points of units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each unit on a surface that will not show in finished structure.
- K. Cure concrete, according to requirements in PCI MNL 117.
- L. Repair damaged units to meet acceptability requirements of PCI MNL 117 and the Resident Engineer.

## **2.13 INSULATED PANEL CASTING**

- A. Cast, screed and consolidate bottom concrete wythe supported by mold.
- B. Place insulation boards, abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Ensure bottom wythe or insulation layer are not disturbed after bottom wythe reaches initial set.
- D. Cast and screed top wythe to meet required finish.
- E. Maintain temperature below 150 deg. F (65 deg. C) in bottom concrete wythe.

## **2.14 FABRICATION TOLERANCES**

- A. Fabricate units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
  - 1. Additional Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
    - a. Location of Bearing Surface from End of Member: Plus or Minus 6 mm (1/4 inch).

- b. Position of Sleeve: Plus or Minus 13 mm (1/2 inch).
- B. Fabricate architectural trim units such as sills, lintels, coping, cornices, quoins, medallions, bollards, benches, planters, and pavers, with tolerances meeting PCI MNL 135.
- C. Brick-Faced Architectural Precast Concrete Units.
  - 1. Alignment of mortar joints:
    - a. Jog in Alignment: 3 mm (1/8 inch).
    - b. Alignment with Panel Centerline: Plus or Minus 3 mm (1/8 inch).
  - 2. Variation in Width of Exposed Mortar Joints: Plus or Minus 6 mm (1/4 inch).
  - 3. Tipping of Individual Bricks from the Panel Plane of Exposed Brick Surface: Plus 1.5 mm (1/16 inch); Minus 6 mm (1/4 inch)  $\leq$  depth of form liner joint.
  - 4. Exposed Brick Surface Parallel to Primary Control Surface of Panel: Plus 6 mm (1/4 inch); Minus 3 mm (1/8 inch).
  - 5. Individual Brick Step in Face from Panel Plane of Exposed Brick Surface: Plus 1.5 mm (1/16 inch); Minus 6 mm (1/4 inch)  $\leq$  depth of form liner joint.

## 2.15 FINISHES

- A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight and sharp.
- B. Thin Brick Facings: Refer to "Thin Brick Facings" Article.
  - 1. Exposed concrete in joints to match mortar in building.
- C. Finish unexposed surfaces of units by float finish.

## 2.16 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to Section 01 45 29, TESTING LABORATORY SERVICES and PCI MNL 117 requirements respectively. If using self-consolidating concrete also test and inspect according to PCI TR-6.
- B. Testing: If there is evidence that the concrete strength of precast concrete units may be deficient, Precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to PCI MNL 117:
  - 1. Test results will be made in writing on the same day that tests are performed, with copies to Resident Engineer, Contractor, and precast concrete fabricator. Test reports will include the information required in Section TESTING LABORATORY SERVICES and the following:

- a. Identification mark and type of precast concrete units represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- C. Defective or Damaged Work: Units that do not comply with acceptability requirements, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cored units may be repaired, if repaired units match the visual mock-up. The Resident Engineer reserves the right to reject any unit if it does not match the accepted samples and visual mock-up. Replace unacceptable units with precast concrete units that comply with requirements.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.
- B. Do not install units until supporting cast-in place concrete building has attained minimum allowable design strength and supporting steel is structurally ready to receive loads from precast.
- C. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Verify that loose clips, hangers, bearing pads, and other accessories to be provided by others are present and properly placed.

### **3.2 ERECTION**

- A. Erect level, plumb and square within the specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
  - 1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
  - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

3. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
  4. Unless otherwise shown provide for uniform joint widths of 13 mm (1/2 inch).
- B. Connect units in position by bolting, welding, grouting, or as otherwise indicated on approved Erection Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting are completed.
1. Disruption of roof flashing continuity by connections is not permitted; concealment within roof insulation is acceptable.
  2. Welding: Comply with applicable requirements for welding.
    - a. Protect units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.
    - b. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.
    - c. Clean weld affected metal surfaces and apply a minimum 100 µm (0.004 inch) thick coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A780.
    - d. Visually inspect all welds critical to precast connections. Visually check all welds for completion and remove, reweld or repair all defective welds.
  3. At bolted connections, use lock washers, tack welding, or other acceptable means to prevent loosening of nuts after final adjustment.
    - a. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connection apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
  4. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
- C. Attachments: Upon approval of Resident Engineer, precast pre-stressed products may be drilled or "shot" for fasteners or small openings. Provided reinforcing or pre-stressing steel is not damaged or cut.

1. Should spalling occur, repair according to this specification section.
- D. Venting and Weeps: Where precast concrete panels form the outer wythe of cavity wall construction, vent the cavity wall.
  1. Use polyvinyl chloride plastic tubing to vent the cavity.
  2. Place plastic vent tubes "tilted down and out" in horizontal and vertical joints.
  3. Space vent tubes in accordance with shop drawings, but not less than two vents per panel or approximately 1220 mm (4 feet) on centers.
- E. Setting.
  1. Clean surfaces forming beds and other joints for precast concrete panels of dust, dirt, and other foreign matter, and wet thoroughly to prevent suction before precast concrete elements are set.
  2. Pack grout between bottom of precast walls and their bearing surfaces filling the entire area free of voids
  3. Rake out joints 25 mm (1-inch) deep for pointing or sealants.
  4. Joints required to have only sealant: Kept free of grout for full depth.
  5. Keep exposed faces of precast concrete elements free of grout.
  6. Remove wedges, spacers, or other appliances which are likely to cause staining from joints.
- F. Sealing of Joints: Where shown and where required to make work watertight: clean, dry and seal joints between precast concrete elements and between precast elements and adjoining materials as specified in Section 07 92 00, JOINT SEALANTS.

### **3.3 ERECTION TOLERANCES**

- A. Erect units level, plumb, square, true, and in alignment without exceeding the erection tolerances of PCI MNL 117, Appendix I.

### **3.4 REPAIRS**

- A. Repairs will be permitted provided structural adequacy of units and appearance are not impaired.
- B. Repair damaged units to meet acceptability requirements of PCI MNL 117.
- C. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 6 m (20 feet).

- D. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
- E. Remove and replace damaged units when repairs do not meet requirements.

### **3.5 CLEANING**

- A. Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to shipping.
- B. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
  - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
  - 2. Clean thin brick as recommended by the manufacturer.
  - 3. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

- - - E N D - - -

**SECTION 04 05 11**  
**MASONRY MORTARING AND GROUTING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Mortar for masonry.
- B. Grout for masonry.

**1.2 RELATED REQUIREMENTS**

- A. Installation of Mortar and Grout: Section 04 20 00, UNIT MASONRY.

**1.3 SUBMITTALS**

- A. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C 270 is to be used. Also include required environmental conditions and admixture limitations.
- B. Reports:
  - 1. Strength test for mortar:
    - a. Historic: Strength test for proposed mix. Provide 10 tests of actual mortar prepared with this mix during the last 12 months.
    - b. Field: Report strength of mortar provide for this project as indicated in PART 3.
  - 2. Strength test for grout:
    - a. Historic: Strength test for proposed mix. Provide 10 tests of actual grout prepared with this mix during the last 12 months.
    - b. Field: Report strength of grout provide for this project as indicated in PART 3.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.4 QUALITY ASSURANCE**

- A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

**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 Concrete Institute: ACI

- 530 .....ACI 530/ASCE 5/TMS 402      Building Code Requirements  
for Masonry Structures; American Concrete Institute  
International.
- 530.1 .....ACI 530.1/ASCE 6/TMS 602 Specification For Masonry  
Structures; American Concrete Institute International.
- C.    American Society for Testing and Materials (ASTM):
- C 91.....Standard Specification for Masonry Cement.
- C 144.....Standard Specification for Aggregate for Masonry Mortar.
- C 150.....Standard Specification for Portland Cement.
- C 207.....Standard Specification for Hydrated Lime for Masonry  
Purposes.
- C 270.....Standard Specification for Mortar for Unit Masonry.
- C 387/C 387M .....Standard Specification for Packaged, Dry, Combined Materials  
for Mortar and Concrete.
- C 404.....Standard Specification for Aggregates for Masonry Grout.
- C476-02 .....Standard Specification for Grout for Masonry
- C 780.....Standard Test Method for Preconstruction and Construction  
Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- C1019.....Standard Test Method for Sampling and Testing Grout.
- C 1142.....Standard Specification for Extended Life Mortar for Unit  
Masonry.
- D.    Brick Industry Association - Technical Notes on Brick Construction (BIA):
- 11-1986 .....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
- 44B.....Wall Ties for Brick Masonry, Tech Notes 44B by the Brick  
Industry Association.
- 46 .....Maintenance of Brick Masonry, Tech Notes 46 by the Brick  
Industry Association

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. This Project will permit the production of mortar and grout using either raw materials (cement, lime, aggregate) or pre-mixed products such as masonry cement and package dry mortar at the Contractor's option.
- B. This Project will permit either ready-mix or site mixed mortar and grout at the Contractor's option.

### **2.2 MATERIALS**

- A. Masonry Cement: ASTM C 91, Type N, unless noted otherwise.
- B. Portland Cement: ASTM C 150, Type I - Normal; color as required to produce approved color sample.
- C. Packaged Dry Mortar: ASTM C 387/C 387M, Type N, using gray color cement.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Mortar Aggregate: ASTM C 144.
- F. Grout Aggregate: ASTM C 404.
- G. Water: Clean and potable.
- H. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979.

### **2.3 MORTAR MIXES**

- A. Ready Mixed Mortar: ASTM C 1142, Type RM.
- B. Mortar for Unit Masonry: ASTM C 270, Property Specification.
  - 1. Exterior, non-loadbearing masonry: Type N, unless noted otherwise.
  - 2. Load-bearing concrete masonry (curved wall): Type S.
- C. Color:
  - 1. For Brick work: Natural gray, to match existing.
  - 2. For Decorative CMU: Color to be selected by Architect.

### **2.4 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

## **2.5 GROUT MIXES**

- A. All Uses: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; mix in accordance with ASTM C 476.

## **2.6 GROUT MIXING**

- A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.
- B. Do not use anti-freeze compounds to lower the freezing point of grout.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Plug clean-out holes for grouted masonry with block masonry units. Brace masonry to resist wet grout pressure.

### **3.2 INSTALLATION**

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 16 inches (400 mm) without consolidating grout by rodding.
- D. Do not displace reinforcement while placing grout.
- E. Remove excess mortar from grout spaces.

### **3.3 FIELD QUALITY CONTROL**

- A. Advise the testing agency, the Owner's Representative and the Architect/ Engineer at least 24 hours before masonry or grout work is to be done.
- B. Mortar Tests: Test each type of mortar in accordance with ASTM C 780, testing once for every 3400 square feet for masonry wall surface laid up, but not less than once per day when mortar is being used.
  - 1. Test for compressive strength.
- C. Grout Tests: . Test each type of mortar in accordance with ASTM C 1019, testing once for every 5 cubic yards of grout installed, but not less than once per day when grout is being used.
  - 1. Test for compressive strength.

--- E N D ---

**SECTION 04 20 00  
UNIT MASONRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies requirements for construction of masonry unit walls.

**1.2 RELATED WORK**

- A. Thin Brick used in precast panels: Section 03 45 00, PRECAST ARCHITECTURAL CONCRETE.
- B. Mortars and grouts: Section 04 05 11, MASONRY MORTARING AND GROUTING.
- C. Steel lintels and shelf angles: Section 05 50 00, METAL FABRICATIONS.
- D. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Masonry units.
  2. Anchors, ties, and reinforcement.
  3. Shear Keys
  4. Reinforcing bars.
- C. Shop Drawings:
1. Reinforcing: Show fabrication, bending, and placement of reinforcing bars. Comply with SP-66. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.
  2. Elevations: Show building joints, expansion joints and control joints.
- D. Certificates:
1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.
  2. Indicating that the following items meet specification requirements:
    - a. Face brick.
    - b. Solid and load-bearing concrete masonry units, including fire-resistant rated units.

3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.

#### **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. To be approximately 4'-0" x 4'-0" in size.
  2. Use brick from random piles of brick delivered on site.
  3. Include reinforcing, ties, flashing, and anchors.
  4. Include sill condition at windows (storefront).
- B. Use sample panels approved by Resident Engineer for standard of workmanship of new masonry work.
- C. Use sample panel to test cleaning methods.
- D. Approved sample may remain as a part of the final construction.

#### **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 Concrete Institute (ACI);
  - SP-66-04 .....ACI Detailing Manual
  - ACI 530/530.1/ERTA-095      Specifications for Masonry Structures.
- C. American Society for Testing and Materials (ASTM):
  - A82-05 .....Steel Wire, Plain, for Concrete Reinforcement.
  - A615/A615M-07.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - A675/A675M-03.....Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
  - C34-03   Structural Clay Load-Bearing Wall Tile
  - C55-06 .....Concrete Building Brick
  - C62-05 .....Building Brick (Solid Masonry Units Made From Clay or Shale)
  - C67-07 .....Sampling and Testing Brick and Structural Clay Tile
  - C90-06 .....Load-Bearing Concrete Masonry Units
  - C140-12 .....Sampling and Testing Concrete Masonry Units and Related Units
  - C426-10 .....Linear Drying Shrinkage of Concrete Masonry Units

- C216-07 .....Facing Brick (Solid Masonry Units Made From Clay or Shale)  
 C476-02 .....Standard Specification for Grout for Masonry  
 C1262-10 .....Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall

Units and Related Concrete Units

- F1667-05 .....Fasteners: Nails, Spikes and Staples

D. Masonry Industry Council:

All Weather Masonry Construction Manual, 2000.

E. American Welding Society (AWS):

- D1.4-05 .....Structural Welding Code – Reinforcing Steel.

F. Federal Specifications (FS):

- FF-S-107C-00 .....Screws, Tapping and Drive

G. Brick Industry Association - Technical Notes on Brick Construction (BIA):

- 11-1986 .....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

## **PART 2 - PRODUCTS**

### **2.1 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.

B. Concrete Brick: ASTM C55, Grade N.

### **2.2 DECORATIVE CONCRETE MASONRY UNITS**

A. Oversized, high-density, concrete masonry units.

B. Performance:

<b>ASTM C-140</b> Absorption (LBS./CU. FOOT)	8
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<b>ASTM C-140</b> Compressive Strength (PSI)	4000 Average
<b>ASTM C-140</b> Density (LBS./CU. FOOT)	130
<b>ASTM C-426</b> Shrinkage	0.030
<b>ASTM C-1262</b> Freeze/Thaw Durability	< 1%

- C. Face Finish: Ground face.
- D. Sizes: Nominal 4"x 4"x 24", 4"x 8"x 24", and 4"x 12"x 24".
- E. Color: To be selected by Architect/Engineer.
- F. Provide trim pieces including sills to match.

### 2.3 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: Modular
  - 4. Match existing building brick. Conform to mix as described for thin brick in Section 03 45 00 PRECAST ARCHITECTURAL CONCRETE.

### 2.4 SHEAR KEYS

- A. ASTM D2000, solid extruded cross-shaped section of rubber, neoprene, or polyvinyl chloride, with a durometer hardness of approximately 80 when tested in accordance with ASTM D2240, and a minimum shear strength of 3.5 MPa (500 psi).
- B. Shear key dimensions: Approximately 70 mm by 8 mm for long flange and 38 mm by 16 mm for short flange (2-3/4 inches by 5/16 inch for long flange, and 1-1/2 inches by 5/8 inch for short flange).

### 2.5 REINFORCEMENT:

- A. Steel Reinforcing Bars: ASTM A615, deformed bars, 420 MPa (Grade 60) for bars No. 10 to No. 57 (No. 3 to No. 18), except as otherwise indicated.
- B. Shop-fabricate reinforcement bars which are shown to be bent or hooked.
- C. Joint Reinforcement:
  - 1. Form from wire complying with ASTM A82.
  - 2. Galvanized after fabrication.

3. Width of strip reinforcement 40 mm (1 5/8-inches) less than nominal width of masonry wall or partition.
  4. Cross wires welded to longitudinal wires.
  5. Strip reinforcing at least 3000 mm (10 feet) in length.
  6. Strip reinforcing in rolls is not acceptable.
  7. Strip reinforcing that is crimped to form drip is not acceptable.
  8. Maximum spacing of cross wires 400 mm (16 inches) to longitudinal wires.
  9. Provide either Ladder or Truss Design:
    - a. Longitudinal wires deformed 5 mm (0.1875 inch) diameter wire.
    - b. Cross wires 4 mm (0.1483 inch) diameter.
  10. Where indicated, provide joint reinforcement design to provide adjustable (eye and pintle) ties to veneer masonry.
- D. Corrugated Wall Tie:
1. Form from 1.5 mm (0.0598 inch) thick corrugated, galvanized steel 30 mm (1-1/4 inches) wide by lengths so as to extend at least 100 mm (4 inches) into joints of new masonry plus 38 mm (1-1/2 inch) turn-up.
  2. Provide 5 mm (3/16 inch) hole in turn-up for fastener attachment.

## **2.6 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.

## **2.7 ACCESSORIES**

- A. Cavity Weeps and Vents: Molded PVC grilles, insect resistant designed to fill one, complete head joint.
- B. Flashing: Provide one of the following:
  1. Rubberized Asphalt Flashing: Self-adhering polymer-modified asphalt sheet; 0.030 inch (0.75 mm) total thickness; with cross-linked polyethylene top and bottom surfaces with stainless steel drip edge - either integral or applied. Flashing must lap over drip edge not less 3/4 inch when rubberized asphalt flashing is held back 3/4 inch inside the mortar face.
  2. Stainless Steel Flashing: 0.5 mm (0.018 inch) thick.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity

vents and allow proper cavity drainage. Panel must provide a multi-level top edge to prevent a continuous band of fallen mortar.

D. 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.

E. 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 ENVIRONMENTAL 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 ACI 530.1 and "Hot and Cold Weather Masonry Construction Manual".

C. Hot Weather Requirements: Comply with ACI 530.1 and "Hot and Cold Weather Masonry Construction Manual".

#### **3.2 PREPARATION**

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

#### **3.3 COURSING**

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units: As indicated on drawings.

D. Brick Units: Match coursing of brick in existing building.

### **3.4 PLACING AND BONDING**

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

### **3.5 MASONRY FLASHINGS**

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
  - 1. Extend flashings full width at such interruptions and at least 4 inches (100 mm) into adjacent masonry or turn up at least 4 inches (100 mm) to form watertight pan at non-masonry construction.
  - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
  - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend metal drip edge strip through exterior face of masonry and turn down to form drip. Set drip edge in sealant to prevent moisture migration under flashing.

### **3.6 WEEPS/CAVITY VENTS**

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels, and near top of walls.

### **3.7 CAVITY MORTAR CONTROL**

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

### **3.8 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames, window frames, anchor bolts, and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  - 1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

### **3.9 REINFORCEMENT AND ANCHORAGE - GENERAL**

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).

### **3.10 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER**

- A. Masonry Facing to Backup and Cavity Wall Ties:
  - 1. Use individual ties for new work.
  - 2. Stagger ties in alternate courses, and space at 400 mm (16 inches) maximum vertically, and 600 mm (2 feet) horizontally.
  - 3. At openings, provide additional ties spaced not more than 900 mm (3 feet) apart vertically around perimeter of opening, and within 300 mm (12 inches) from edge of opening.
  - 4. Anchor new masonry facing to existing masonry with corrugated wall ties spaced at 400 mm (16 inch) maximum vertical intervals and at every second masonry unit horizontally. Fasten ties to masonry with masonry nails.
  - 5. Option: Use joint reinforcing for multiple wythes and cavity wall ties spaced not more than 400 mm (16 inches) vertically.
  - 6. Tie interior and exterior wythes of reinforced masonry walls together with individual ties. Provide ties at intervals not to exceed 600 mm (24 inches) on center horizontally, and 400 mm (16 inches) on center vertically. Lay ties in the same line vertically in order to facilitate vibrating of the grout pours.

### 3.11 LINTELS AND MASONRY BEAMS

- A. Provide lintels above all openings greater than 7 inches (178 mm) inches in width.
- B. Install loose steel lintels over openings where indicate. See Section 05500 - Metal Fabrications for additional requirements for steel lintels.
  - 1. Minimum brick bearing on steel of angle lintels shall be not less than 2½ inches (63.5 mm).
  - 2. Install flashing, and weeps above all steel lintels as described in this Section and as shown on Drawings.
- C. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
  - 1. Provide reinforcing as indicated. If not indicated elsewhere, provide reinforcing as follows:
    - a. Openings to 78 inches (1980 mm): Place two, No. 5 (M16) reinforcing bars 1 inch (25 mm) from bottom web.
    - b. Openings over 78 inches (1980 mm), unless detailed on Drawings, request direction from the Architect/Engineer.
  - 2. Do not splice reinforcing bars in masonry lintels. If necessary, provide tension transferring end connectors.
  - 3. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
  - 4. Place and consolidate grout fill without displacing reinforcing.
  - 5. Allow masonry lintels to attain specified strength before removing temporary supports.
  - 6. Install flashing, and weeps above all solid grouted masonry lintels as described in this Section and as shown on Drawings.
- D. Masonry Beams: In addition to masonry lintels, provide embedded masonry beams (bond beams) as follows:
  - 1. Provide masonry beams where shown on the Drawings and as noted in this Section.
  - 2. Unless noted otherwise, provide two, No. 5 (M16) reinforcing bars 1 inch (25 mm) from bottom web in all masonry beams.
  - 3. Splices of reinforcing must be lapped 48 bar diameters unless noted otherwise and joints in multiple bars must be staggered.

4. At exposed corners provide a block with a closed exterior face on both of the outer faces of the corner. This may be done using specially formed blocks or by using a normal corner block and breaking out portions of the webs to allow the reinforcing bars (and minimum grout cover) to pass through.
  5. Install flashing, and weeps above solid grouted masonry beams as described in this Section and as shown on Drawings.
- E. Maintain minimum 8 inch (200 mm) bearing on each side of opening unless noted otherwise.

### **3.12 GROUTED COMPONENTS**

- A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- B. Where lapping bars would result in less than 3/4 inch space for grout on any side of the bars, use mechanical end splice connectors in lieu of lapping.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.

### **3.13 CONTROL AND EXPANSION JOINTS**

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Provide expansion joints wherever an expansion joint occurs in the building or back up construction.
- C. Provide control joints where indicated on Drawings and as follows:
  1. General Vertical Joint Spacing: Provide a vertical control joint at not more than 25 feet (7.6 M) or 1.5 times the height of the panel on center horizontally.
  2. Provide a vertical control joint at one side of each corner at not less than 2 feet (609 mm) from the corner and not more than one-half the general vertical joint spacing from the corner, unless indicated otherwise.
  3. Provide horizontal control joints below all continuous shelf angles.
  4. Provide horizontal control joints below any cantilevered beams or floors or other fixed building elements that break the masonry panel, including embedded, exposed concrete beams.
  5. Provide horizontal joints as necessary so that vertical dimension of panels does not exceed 1.5 times the panel width or 25 feet, whichever is less.

- D. If the requirements of this Section or good practice indicate the need for a joint where none is shown on the Drawings, consult with Architect/Engineer to determine exact location to provide the required joint.
- E. CMU Control Joints.
1. Provide CMU control (CJ) joints where shown on drawings.
  2. Keep joint free of mortar and other debris.
  3. Where joints occur in masonry walls.
    - a. Install preformed compressible joint filler in brick wythe.
    - b. Install cross shaped shear keys in concrete masonry unit wythe with preformed compressible joint filler on each side of shear key.
    - c. Install filler, backer rod, and sealant on exposed faces.
  4. 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. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.
  5. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.
- F. Building Expansion Joints
1. Keep joint free of mortar. Remove mortar and other debris.
  2. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.
  3. 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.
- G. Isolation Seal
1. 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.
  2. Insert in the separation, a continuous full width strip of non-combustible type compressible joint filler.
  3. 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.

### 3.14 GROUTING

#### A. Preparation:

1. Clean grout space of mortar droppings before placing grout.
2. Close cleanouts with masonry units.
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. Low Lift Method:

1. Double wythe masonry constructed grouted in lifts not to exceed 200 mm (8 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. High Lift Method:

1. Do not pour grout until masonry wall has properly cured a minimum of 72 hours.
2. Place grout in one continuous operation.
3. Complete in one day with no interruptions greater than one hour sections of a wall between control barriers.
4. Grout double wythe walls in a single continuous pour of grout to the top of the wall in 1200 mm (4 foot) layers or lifts in the same working day, with a minimum waiting

period of 10 minutes between each 1200 mm (four foot) layer or lift. Vibrate grout layer or lift thoroughly to fill voids.

5. Grout for cavities of double wythe type walls less than 50 mm (2 inches) wide: Do not pour from a height exceeding 300 mm (1 foot).
6. When vibrating succeeding lifts, extend vibrator 300 to 450 mm (12 to 18 inches) into the preceding lift to close any shrinkage cracks or separation from the masonry units.

### **3.15 LOAD BEARING ASSEMBLIES**

- A. Curved Entry Wall:  $F_c = 1500$  psi.

### **3.16 CLEANING AND REPAIR**

- A. General:

1. Clean exposed masonry surfaces on completion.
2. Protect adjoining construction materials and landscaping during cleaning operations.
3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
4. Remove mortar droppings and other foreign substances from wall surfaces.

- B. Brickwork:

1. First wet surfaces with clean water, then wash down with a solution of soapless detergent. Do not use muriatic acid.
2. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.
3. Free clean surfaces of traces of detergent, foreign streaks, or stains of any nature.

- C. Concrete Masonry Units:

1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
2. Allow mud to dry before brushing.

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**SECTION 05 12 00**  
**STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. 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: IBC 2006 Table 1704.3
- B. Painting: Section 09 91 00, PAINTING.
- C. Steel Decking: Section 05 31 00, STEEL DECKING.

**1.3 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.
- B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the Resident Engineer.
- C. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Iowa.

**1.4 TOLERANCES:**

- A. 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 Manual, 13<sup>th</sup> Edition, Page 163-1), except as follows:
- B. Elevation tolerance for column splice points at time member is erected is 10 mm (3/8 inch).
- C. Elevation tolerance for top surface of steel beams and girders at connections to columns at time floor is erected is 13 mm (1/2 inch).
- D. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

**1.5 DESIGN:**

- A. Connections: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with the details shown on the Drawings, supplementing where necessary. The details shown on the Drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing,

accounting for all loads and eccentricities in both the connection and the members. Promptly notify the Resident Engineer of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the Resident Engineer. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

#### **1.6 REGULATORY REQUIREMENTS:**

- A. AISC: Specification for Structural Steel Buildings - LRFD Specification for Structural Steel Buildings.
- B. AISC: Code of Standard Practice for Steel Buildings and Bridges.

#### **1.7 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop and Erection Drawings: Complete
- C. Certificates:
  - 1. Structural steel.
  - 2. Steel for all connections.
  - 3. Welding materials.
  - 4. Shop coat primer paint.
- D. Test Reports:
  - 1. Welders' qualifying tests.
- E. Design Calculations and Drawings:
  - 1. Connection calculations, if required.
- F. Record Surveys.

#### **1.8 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Institute of Steel Construction (AISC):
  - 1. Load and Resistance Factor Design Specification for Structural Steel Buildings (13<sup>th</sup> Edition, 2005)
  - 2. Code of Standard Practice for Steel Buildings and Bridges (2005).
- C. American National Standards Institute (ANSI):
  - B18.22.1-98 .....Plain Washers
  - B18.22M-00.....Metric Plain Washers

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

- A6/A6M-02.....Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
- A36/A36M-01.....Standard Specification for Carbon Structural Steel
- A53/A53M-01.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- A123/A123M-02.....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A242/A242M-01.....Standard Specification for High-Strength Low-Alloy Structural Steel
- A283/A283M-00.....Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
- A307-00 .....Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- A325-02 .....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- A490-02 .....Standard Specification for Heat-Treated Steel Structural Bolts 150 ksi Minimum Tensile Strength
- A500-01 .....Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- A501-01 .....Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
- A992/A992M-02.....Standard Specification for Structural Steel Shapes

E. American Welding Society (AWS):

- D1.1-02 .....Structural Welding Code-Steel

F. Research Council on Structural Connections (RCSC) of The Engineering Foundation:

- Specification for Structural Joints Using ASTM A325 or A490 Bolts

G. Military Specifications (Mil. Spec.): (BBSAE to verify)

- MIL-P-21035 .....Paint, High Zinc Dust Content, Galvanizing, Repair

H. Occupational Safety and Health Administration (OSHA):

- 29 CFR Part 1926-2001 Safety Standards for Steel Erection

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Structural Steel: ASTM A36, A992.

- B. Structural Tubing: ASTM A500, Grade B.
- C. Steel Pipe: ASTM A53, Grade B.
- D. 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.
- E. Zinc Coating: ASTM A123.
- F. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035.

## **2.2 FABRICATION:**

- A. Fabrication in accordance with Chapter M, Specification for Steel Buildings - Load and Resistance Factor Design.

## **2.3 SHOP PAINTING:**

- A. General: Shop paint steel with primer in accordance with Section 6, Code of Standard Practice for Steel Buildings and Bridges.
- B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.
- C. Do not apply paint to following:
  - 1. Surfaces within 50 mm (2 inches) of joints to be welded in field.
  - 2. Surfaces which will be encased in concrete.
  - 3. Surfaces which will receive sprayed on fireproofing.
  - 4. Top flange of members which will have shear connector studs applied.
- D. Structural steel in the interstitial space that does not receive sprayed on fireproofing shall be painted with primer in accordance with general requirement of shop painting.
- E. 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.

## **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. 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 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.

### **3.3 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.

### **3.4 SURVEY:**

- A. Upon completion of finish bolting or welding on any part of the work, and prior to start of work by other trades that may be supported, attached, or applied to the structural steel work, submit a certified report of survey to Resident Engineer for approval. Reports shall be prepared by Registered Land Surveyor or Registered Civil Engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS. Report shall specify that location of structural steel is acceptable for plumbness, level and alignment within specified tolerances specified in the AISC Manual.

- - - END - - -



**SECTION 05 31 00  
STEEL DECKING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies material and services required for installation of steel decking as shown and specified.

**1.2 RELATED WORK:**

- A. Finish Painting: Section 09 91 00, PAINTING.

**1.3 DESIGN REQUIREMENTS:**

- A. Design steel decking in accordance with AISI publication, "Specification for the Design of Cold-formed Steel Structural Members" except as otherwise shown or specified.
- B. Design all elements with the latest published version of applicable codes.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Shop and erection drawings showing decking unit layout, connections to supporting members, and similar information necessary for completing installation as shown and specified, including supplementary framing, sump pans, ridge and valley plates, cant strips, cut openings, special jointing or other accessories. Show welding, side lap, closure, deck reinforcing and closure reinforcing details. Show openings required for work of other trades, including openings not shown on structural drawings. Indicate where temporary shoring is required to satisfy design criteria.
- C. Manufacturer's Literature and Data: Showing steel decking section properties and specifying structural characteristics.
- D. Certification: For each type and gauge of metal deck supporting concrete slab or fill, furnish certification of the specified fire ratings. Certify that the units supplied are U.L. listed as a "Steel Floor and Form Unit".
- E. Insurance Certification: Assist the Government in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance. (BBSAE to verify)

**1.5 QUALITY ASSURANCE:**

- A. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.
- B. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual Global and are listed in "Factory Mutual Research Approval Guide" for "Class 1" fire rated construction. (BBSAE to verify)

**1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only. Refer to the latest edition of all referenced Standards and codes.
- B. American Society for Testing and Materials (ASTM):
  - A36/A36M.....Standard Specification for Carbon Structural Steel
  - A611 .....Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled
  - A653/A653M.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
  - C423.....Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- C. American Institute of Steel Construction (AISC):
  - Load and Resistance Factor Design Specification for Structural Steel Buildings (Latest Edition)
- D. American Iron and Steel Institute (AISI):
  - Specification and Commentary for the Design of Cold-Formed Steel Structural Members
- E. American Welding Society (AWS):
  - D1.3 .....Structural Welding Code - Sheet Steel
- F. Factory Mutual (FM Global):
  - Loss Prevention Data Sheet 1-28: Wind Loads to Roof Systems and Roof Deck Securement
  - 1. 2. Factory Mutual Research Approval Guide (Latest Edition)
- G. Military Specifications (Mil. Spec.) (BBSAE to verify)
  - MIL-P-21035B.....Paint, High Zinc Dust Content, Galvanizing Repair

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Steel Decking: ASTM A653, Structural .
- 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 1.3 mm (18 gauge) sheet steel.
  - 2. Continuous Sheet Metal Edging: At openings, concrete slab edges and roof deck edges. Same quality as deck units but not less than 1.3 mm (18 gauge) steel. Side and end closures supporting concrete and their attachment to supporting steel shall be designed by the manufacturer to safely support the wet weight of concrete and construction loads. The deflection of cantilever closures shall be limited to 3 mm (1/8 inch) maximum.
  - 3. Metal Closure Strips: For openings between decking and other construction, of not less than 1.3 mm (18 gauge) sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends of flutes and sides of decking.
  - 4. Ridge and Valley Plates: Provide 1.3 mm (18 gauge), minimum 100 mm (4 inch) wide ridge and valley plates where roof slope exceeds 40 mm per meter (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 1 mm (20 gauge) metal with a minimum 125 mm (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 1.9 mm (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 75 mm (3 inches) wide. Recess pans not less than 38 mm (1 1/2

inches) below roof deck surface, unless otherwise shown or required by deck configuration.

Holes for drains will be cut in the field.

## **2.2 REQUIREMENTS:**

- A. Provide steel decking of the type, depth, gauge, and section properties as shown.
- B. Metal Roof Deck: Single pan fluted units with flat horizontal top surfaces utilized to act as a permanent support for all superimposed loads. Comply with the depth and minimum gage requirements as shown on the Contract Documents.
  - 1. Wide Rib (Type F) deck.
  - 2. Finish: Galvanized G-60.
  - 3. Finish: Prime painted. Apply finished coat of paint to underside of deck after installation.  
Color as selected by Architect.
- C. Metal Form Deck – Type 1: Single pan fluted units utilized as a permanent form for reinforced concrete slabs. Comply with the depth and gauge requirements as shown on the Contract Documents.
  - 1. Finish: Galvanized G-60.
- D. Do not use steel deck for hanging supports for any type or kind of building components including suspended ceilings, electrical light fixtures, plumbing, heating, or air conditioning pipes or ducts or electrical conduits.

## **PART 3 - EXECUTION**

### **3.1 ERECTION:**

- A. Do not start installation of metal decking until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed. Remove any oil, dirt, paint, ice, water and rust from steel surfaces to which metal decking will be welded.
- B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- C. Do not use floor deck units for storage or working platforms until permanently secured. Do not overload deck units once placed. Replace any deck units that become damaged after erection and prior to casting concrete at no cost to the Government.
- D. Provide steel decking in sufficient lengths to extend over 3 or more spans, 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 50 mm (2 inches) and shall occur over supports.
- F. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. with a minimum of two welds per unit at each support. Where two units abut, fasten each unit individually to the supporting steel framework.
  2. Tack weld or use self-tapping No. 8 or larger machine screws at 915 mm (3 feet) o.c. for fastening end closures. Only use welds to attach longitudinal end closures.
  3. Weld side laps of adjacent floor deck units that span more than 1524 mm (5 feet). Fasten at midspan or 915 mm (3 feet) o.c., whichever is smaller.
  4. Fasten roof deck units to steel supporting members by not less than 16 mm (5/8 inch) diameter puddle welds or elongated welds of equal strength, spaced not more than 305 mm (12 inches) o.c. at every support, and at closer spacing where required for lateral force resistance by diaphragm action. Attach split or partial panels to the structure in every valley. In addition, secure deck to each supporting member in ribs where side laps occur. Power driven fasteners may be used in lieu of welding for roof deck if strength equivalent to the welding specified above is provided. Submit test data and design calculations verifying equivalent design strength.
  5. Mechanically fasten side laps of adjacent roof deck units with spans greater than 1524 mm (5 feet) between supports, at intervals not exceeding 915 mm (3 feet) o.c., or midspan, whichever is closer, using self-tapping No. 8 or larger machine screws.
  6. Provide any additional fastening necessary to comply with the requirements of Underwriters Laboratories and/or Factory Mutual to achieve the required ratings.
  7. Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 2.1 kPa (45 psf) at eave overhang and 1.4 kPa (15 psf) for other roof areas.
  8. Weld end laps of corrugated form deck units in valley of side lap and at middle of sheet (maximum spacing of welds is 380 mm (15 inches)).
  9. Weld corrugated deck to intermediate supports in an X pattern. Weld in valley of side laps on every other support and in the valley of the center corrugation on the remaining supports (maximum spacing of welds is 760 mm (30 inches)).
- G. Cutting and Fitting:
1. Cut all metal deck units to proper length in the shop prior to shipping.

2. Field cutting by the metal deck erector is restricted to bevel cuts, notching to fit around columns and similar items, and cutting openings that are located and dimensioned on the Structural Drawings.
3. Other penetrations shown on the approved metal deck shop drawings but not shown on the Structural Drawings are to be located, cut and reinforced by the trade requiring the opening.
4. Make all cuts neat and trim using a metal saw, drill or punchout device; cutting with torches is expressly prohibited.
5. Do not make any cuts in the metal deck that are not shown on the approved metal deck drawings. If an additional opening not shown on the approved shop drawings is required, submit a sketch, to scale, locating the required new opening and any other openings and supports in the immediate area. Do not cut the opening until the sketch has been reviewed and accepted by the Resident Engineer. Provide any additional reinforcing or framing required for the opening at no cost to the Government. Failure to comply with these requirements is cause for rejection of the work and removal and replacement of the affected metal deck.
6. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

### **3.2 WELDING:**

- 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. Welds to be thoroughly cleaned and touched-up.
- B. At areas scarred during erection, repair galvanization and primer

- - - END - - -

**SECTION 05 40 00**  
**COLD-FORMED METAL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior non-load-bearing steel stud curtain wall.

**1.2 RELATED WORK:**

- A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. 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 QUALITY ASSURANCE:**

- A. Welding in accordance with AWS D1.3. Welders must be certified within the last 12 months.
- B. Furnish members and accessories by one manufacturer only.

**1.4 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.
  3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).
  4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
  5. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

6. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare stamped design calculations, shop drawings, and other structural data.

## **1.5 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. Certificates: Welders' certificates showing current certification.
- E. Design Calculations: Submit for record.

## **1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American 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(REV. A)-2003      Standard Specifications for Carbon Structural Steel
  - A123/A123M-2002.....Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - A153/A153M-2003.....Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - A307-2002 .....Standard Specifications for Carbon Steel Bolts and Studs
  - A653/A653M-2003.....Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - C955-2003 .....Standard Specifications for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

C1107-2002 .....Standard Specifications for Packaged Dry, Hydraulic-Cement  
Grout (Non-shrink)

E488-96(Reapproved 2003)Standard Test Methods for Strength of Anchors in Concrete  
and Masonry Elements

E1190-95(Reapproved 2000)Standard Test Methods for Strength of Power-Actuated  
Fasteners Installed in Structural Members

C. D. American Welding Society (AWS):

D1.3-(98).....Structural Welding Code-Sheet Steel

D. E. Military Specifications (Mil. Spec.):

MIL-P-21035B(Reinst. Notice 2)      Paint, High Zinc Dust Content, Galvanizing  
Repair

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Sheet Steel for joists, studs and accessories 16 gage and heavier: ASTM A653, structural steel, zinc coated G90, with a yield of 340 MPa (50 ksi) minimum.
- B. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated G90, with a yield of 230 MPa (33 ksi) minimum.
- C. Galvanizing Repair Paint: MIL-P-21035B.

### **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: 0.90 mm (0.040 inch), minimum
  - 2. Flange Width: 38 mm (1-1/2 inches), minimum.
  - 3. Web: Punched or Unpunched .
- B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:
  - 1. Design Uncoated-Steel Thickness: Matching steel studs.
  - 2. Flange Width: Manufacturer's standard deep flange where indicated, standard flange elsewhere.

### **2.3 FRAMING ACCESSORIES:**

- A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Gusset plates.
5. Deflection track and vertical slide clips.
6. Stud kickers and girts.
7. Reinforcement plates.

## **2.4 ANCHORS, CLIPS, AND FASTENERS:**

- A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.
- B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

## **2.5 SEALING ACCESSORIES**

- A. Sill Sealer Gasket: Where track is used as a plate for an exterior wall, provide a continuous sill sealer gasket conforming to the following:
  1. Material: Closed-cell polyethylene form.
  2. Thickness: 6 mm (1/4 inch) (uncompressed).
  3. Width: Not less than the width of the plate minus 13 mm (1/2 inch).

## **PART 3 - EXECUTION**

### **3.1 FABRICATION:**

- A. Framing components may be preassembled into panels. Panels shall be square with components attached.

- B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.
- C. Hold members in place until fastened.
- D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
  - 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
  - 2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

### **3.2 ERECTION:**

- A. Handle and lift prefabricated panels in a manner as to not distort any member.
- B. Securely anchor tracks to supports as shown.
- C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.
- D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.
- E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.
- F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.
- G. Install headers in all openings that are larger than the stud spacing in that wall.
- H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.
- I. Studs in one piece for their entire length, splices will not be permitted.
- J. Provide a load distribution member at top track where joist is not located directly over bearing stud.
- K. Provide joist bridging and web stiffeners at reaction points where shown.
- L. Provide end blocking where joist ends are not restrained from rotation.
- M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one-half joist span and when floor and roof openings interrupt one or more spanning members.
- N. Provide temporary bracing and leave in place until framing is permanently stabilized.

- O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.
- P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

### **3.3 TOLERANCES:**

- A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.
- C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
- D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

### **3.4 FIELD REPAIR:**

- A. Touch-up damaged galvanizing with galvanizing repair paint.

- - - END - - -

**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. Supports

**1.2 RELATED WORK**

- A. Nosings for insertion in concrete stairs: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Steel stairs and railings: Section 05 51 00, METAL STAIRS.
- C. Grating for floor trenches: Section 05 53 10, GRATINGS.
- D. Prime and finish painting: Section 09 91 00, PAINTING.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. 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. Certificates: Welders' certificates showing current certification.
- D. Design Calculations for items sized or designed by the fabricator.
- 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. Design connections and other aspects of the work not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Iowa.

- B. 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.
- C. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- D. Each product type shall be the same and be made by the same manufacturer.
- E. Assembled product to the greatest extent possible before delivery to the site.

## **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):
  - B18.2.2-87(R2005) .....Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):
  - A36/A36M-05.....Structural Steel
  - A53-06 .....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
  - A123-02 .....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
  - A653/A653M-07.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
  - A992/A992M.....Standard Specification for Structural Steel Shapes.
  - C1107-07 .....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - F436-07 .....Hardened Steel Washers
  - F468-06.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
  - F593-02.....Stainless Steel Bolts, Hex Cap Screws, and Studs
  - F1667-05.....Driven Fasteners: Nails, Spikes and Staples
- D. American Welding Society (AWS):
  - D1.1-04 .....Structural Welding Code Steel
  - D1.2-03 .....Structural Welding Code Aluminum
  - D1.3-98 .....Structural Welding Code Sheet Steel
- E. National Association of Architectural Metal Manufacturers (NAAMM)
  - AMP 500-505-1988 .....Metal Finishes Manual

F. Structural Steel Painting Council (SSPC):

SP 1-05.....No. 1, Solvent Cleaning

SP 2-05.....No. 2, Hand Tool Cleaning

SP 3-05.....No. 3, Power Tool Cleaning

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Structural Steel: ASTM A36 or A992.
- B. Stainless Steel: ASTM A167, Type 302 or 304.
- C. Steel Pipe: ASTM A53.
  - 1. Galvanized for exterior locations.
  - 2. Type S, Grade A unless specified otherwise.
  - 3. NPS (inside diameter) as shown.
- D. Primer Paint: As specified in Section 09 91 00, PAINTING.
- E. Grout: ASTM C1107, pourable type.

### **2.2 HARDWARE**

- A. Rough Hardware and Fasteners: Galvanized, unless noted otherwise.

### **2.3 FABRICATION GENERAL**

- A. Material
  - 1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
  - 2. Use material free of defects which could affect the appearance or service ability of the finished product.
- B. Size:
  - 1. Size and thickness of members as shown.
  - 2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.
- C. Connections
  - 1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
  - 2. Field riveting will not be approved.
  - 3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
  - 4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.

5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

#### D. Fasteners and Anchors

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

#### E. Workmanship

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

- g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
  - h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
- a. Weld in accordance with AWS.
  - b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
  - c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
  - d. Finish welded joints to match finish of adjacent surface.
3. Joining:
- a. Miter or butt members at corners.
  - b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
- a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
  - b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
5. Cutting and Fitting:
- a. Accurately cut, machine and fit joints, corners, copes, and miters.
  - b. Fit removable members to be easily removed.
  - c. Design and construct field connections in the most practical place for appearance and ease of installation.
  - d. Fit pieces together as required.
  - e. Fabricate connections for ease of assembly and disassembly without use of special tools.
  - f. Joints firm when assembled.
  - g. Conceal joining, fitting and welding on exposed work as far as practical.
  - h. Do not show rivets and screws prominently on the exposed face.

- i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.
- F. Finish:
  - 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
  - 2. 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 NAAMM-500 series.
- G. Protection:
  - 1. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

## **2.4 SUPPORTS**

- A. General:
  - 1. Fabricate ASTM A36 or A992 structural steel shapes as shown.
  - 2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
  - 3. Field connections may be welded or bolted.
- B. For Wall Mounted Items:
  - 1. For items supported by metal stud partitions.
  - 2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.

3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.

## **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.
- C. Field weld in accordance with AWS.
  1. Design and finish as specified for shop welding.
  2. Use continuous weld unless specified otherwise.
- D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- E. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.
- F. Isolate dissimilar metals and isolate metals from contact with concrete and masonry materials (except where intended to bond) as required to prevent electrolysis and corrosion.
- G. Secure escutcheon plate with set screw.

### **3.2 INSTALLATION OF SUPPORTS**

- A. Anchorage to structure.
  1. Secure supports to concrete inserts by bolting or continuous welding as shown.
  2. 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.
  3. Secure steel plate or hat channels to studs as detailed.

### **3.3 CLEAN AND ADJUSTING**

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

--- E N D ---

**SECTION 05 51 00  
METAL STAIRS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies steel stairs with railings.
- B. Types: Industrial stairs: open riser stairs.

**1.2 RELATED WORK**

- A. Wall handrails and railings for other than steel stairs: Section 05 50 00, METAL FABRICATIONS.

**1.1 1.3 QUALITY ASSURANCE:**

- A. Design connections and portions of the work not specifically size or detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Iowa.
- B. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges.
- C. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
  - 1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
  - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
  - 3. Provide templates and rough-in measurements as required.
- C. Certificates: Welders' certificates showing current certification.
- D. Design Calculations for items sized or designed by the fabricator.
- 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 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-05.....Structural Steel
  - A53-06 .....Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless
  - A307-07 .....Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
  - A653/653M-07.....Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated (Galvannealed) by the Hot-Dip Process
  - A563-07 .....Carbon and Alloy Steel Nuts
  - A1008-07 .....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low-Alloy
  - A786/A786M-00.....Rolled Steel Floor Plates
  - A1011-04 .....Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural, High-Strength, Low-Alloy
- C. American Iron and Steel Institute (AISI):
  - 2001 .....Design of Cold-Formed Steel Structural Members
- D. American Welding Society (AWS):
  - D1.1-04 .....Structural Welding Code-Steel
  - D1.3-98 .....Structural Welding Code-Sheet Steel
- E. The National Association of Architectural Metal Manufacturers (NAAMM) Manuals:
  - MBG531-09 .....Metal Bar Grating Manual
  - AMP-510 -92 .....Metal Stair Manual
  - AMP-521-01 .....Pipe Railing Manual, Including Round Tube
- F. Society for Protective Coatings (SSP)
  - SSPC-Paint 20.....Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004)

## PART 2 - PRODUCTS

### 2.1 DESIGN CRITERIA

- A. Structural design, fabrication and assembly in accordance with requirements of NAAMM AMP-510, except as otherwise specified or shown.
- B. Design stairs to support a live load of 500 kg/m<sup>2</sup> (100 pounds per square foot).

- C. Design Grating treads in accordance with NAAMM MBG531.
- D. Design pipe railings in accordance with NAAMM AMP-521 for 900 N (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 MBG, welded type with integral abrasive nosing.
- C. Sheet Steel: ASTM A1008.
- D. Structural Steel: ASTM A36.
- E. All steel, including grates, to be hot dip galvanized to not less than G90 according to ASTM A653/653M.

## **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.

## **2.4 RAILINGS**

- A. Fabricate railings, including handrails, from steel pipe with flush joints.
  - 1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
- B. Return ends of handrail to wall and close free end.
- C. Space intermediate posts not over six feet on center between end post.
- D. Fabricate handrail brackets from cast malleable iron.
- E. Provide standard terminal fittings at ends of post and rails.

## **2.5 INDUSTRIAL STAIRS**

- A. Provide treads, platforms, railings, stringers and other supporting members as shown.
- B. Treads and platforms of steel grating:
  - 1. Fabricate steel grating treads and platforms in accordance with requirements of NAAMM MBG531.
  - 2. Provide end banding bars, except where carrier angle are used at tread ends.
  - 3. Support treads by use of carrier plate end banding bars on exterior stairs.
  - 4. Provide abrasive nosing on treads and edge of platforms at landings.
  - 5. Provide toe plates on platforms where shown.

## **2.6 FINISHES**

- A. Stairs, grates and railing to be exposed galvanized finish.

## **PART 3 - EXECUTION**

### **3.1 STAIR INSTALLATION**

- A. Provide hangers and struts required to support the loads imposed.
- B. Perform job site welding and bolting as specified for shop fabrication.
- C. Set stairs and other members in position and secure to structure as shown.
- D. Install stairs plumb, level and true to line.
- E. Provide steel closure plate to fill any gap between the stringer and surrounding shaft wall.  
Weld and finish with prime and paint finish of adjoining steel.

### **3.2 RAILING INSTALLATION**

- A. Install standard terminal fittings at ends of posts and rails.
- B. Secure brackets, posts and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.
- C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3650 mm (1/8-inch in 12 feet).
- D. Set posts plumb and aligned to within 3 mm in 3650 mm (1/8-inch in 12 feet).

### **3.3 FIELD FINISH REPAIRS**

- A. Touch up abraded galvanized areas with coating conforming to SSPC-Paint 20.

--- E N D ---

## **SECTION 05 53 10 GRATINGS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section specifies manufactured metal floor gratings, perimeter closure and accessories.

#### **1.2 RELATED WORK**

- A. Section 05 50 00, METAL FABRICATIONS.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Load Design: NAAMM MBG 531.
- B. Design Live (Pedestrian) Load: Uniform load of 100 lb/sq ft (4.7 KPa) minimum; concentrated load of 300 lbs (1330 N).
- C. Maximum Allowable Deflection Under Live Load: 1/240; size components by single support design.

#### **1.4 SUBMITTALS**

- A. Product Data: Provide product description including span and deflection tables.
- B. Shop Drawings: Indicate details of component supports, openings, perimeter construction details, and tolerances.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

#### **1.5 QUALITY ASSURANCE**

- A. Design gratings under direct supervision of a Professional Structural Engineer experienced in design of this type of work and licensed in Iowa. Structural Engineers licensed in other states of the United States may be considered upon written request. Acceptance will be based on relative licensure equivalency.

#### **1.6 PROJECT CONDITIONS**

- A. Verify that field measurements are as indicated on drawings.
- B. Coordinate the work with placement of frames, tolerances for placed frames.

#### **1.7 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-05.....Structural Steel
  - A123/A123M-02.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A 153M-05.....Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

C. American Welding Society (AWS):

A2.4 .....Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society

D1.1-04 .....Structural Welding Code Steel

D. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 500-505-1988 .....Metal Finishes Manual

MBG 531 .....Metal Bar Grating Manual; The National Association of Architectural Metal Manufacturers (ANSI/NAAMM MBG 531).

E. Society of Protective Coating (AKA: Structural Steel Painting Council - SSPC):

SSPC-Paint 20.....Zinc-Rich Primers (Type I, "Inorganic," and Type II,"Organic")

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Steel For Welding or Riveting: ASTM A 36/A 36M, unfinished, of shapes indicated.
- B. Bearing Bar Size: Not less than 1 x 1/8 inch (25.4 x 3.18 mm) at maximum 4 inches (102 mm) by 11/16 inch (17 mm) on center.
- C. Welding Materials: AWS D1.1; type required for materials being welded.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### **2.2 ACCESSORIES**

- A. Fasteners and Saddle Clips: Galvanized steel:
- B. Perimeter Closure: Of same material as grating.

### **2.3 GRATING FOR TRENCH COVER:**

- A. Plank formed of galvanized sheet steel.
- B. Surface: Perforated (circular pattern) and raised at perforations to form "skid resistant buttons".
- C. Thickness: Gage as required for spans and loads indicated but not less than 14 gage (1.9 mm) (0.079 in).
- D. Cut to maximum 1.52 m (5'-0") lengths for installation.

### **2.4 FABRICATION**

- A. Grating Type: NAAMM MBG 531 - Welded.
- B. Fabricate support framing for openings and irregular shapes.

**2.5 FINISHES**

- A. All components to have exposed, galvanized finish.
- B. Galvanizing for Steel Shapes: ASTM A 123/A 123M.
- C. Galvanizing for Steel Hardware: ASTM A 153/A 153M.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that opening sizes and dimensional tolerances are acceptable.
- B. Verify that supports are correctly positioned.

**3.2 PREPARATION**

- A. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

**3.3 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions.
- B. Place frames in correct position, plumb and level.
- C. Mechanically cut galvanized finish surfaces. Do not flame cut.
- D. Set perimeter as shown on Drawings.
- E. Secure to prevent movement.
- F. Touch up galvanization as required after installation.

**3.4 TOLERANCES**

- A. Conform to NAAMM MBG 531.

--- END ---



## SECTION 06 10 00 ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 DESCRIPTION:

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

#### 1.2 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.

#### 1.3 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):
  - B18.2.1A-96(R2005) ....Square and Hex Bolts and Screws
  - B18.2.2-87(R2005) .....Square and Hex Nuts
  - B18.6.1-81 (R97) .....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):
  - A653/A653M-07.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated  
(Galvannealed) by the Hot Dip Process
  - C954-04 .....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

C1002-04 .....Steel Self-Piercing Tapping Screws for the Application of  
Gypsum Panel Products or Metal Plaster Bases to Wood Studs  
or Metal Studs

D143-94(R2004).....Small Clear Specimens of Timber, Method of Testing

D1760-01 .....Pressure Treatment of Timber Products

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

F1667-05 .....Nails, Spikes, and Staples

E. Military Specification (Mil. Spec.):

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

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

PS 1-95.....Construction and Industrial Plywood

PS 20-05.....American Softwood Lumber Standard

## **PART 2 - PRODUCTS**

### **2.1 LUMBER:**

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

1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. 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. 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.
  - a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.

- b. Lumber over 50 mm (2 inches) thick: 25 percent or less.
- E. Fire Retardant Treatment:
  - 1. 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.
  - 3. All lumber on this Project to be fire retardant treated.
- F. Preservative Treatment:
  - 1. Do not treat Heart Wood of either Redwood or Western Red Cedar.
  - 2. Treat wood members and plywood exposed to weather or where water or high moisture are likely to occur (including in walls containing plumbing pipes) 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. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

## **2.2 PLYWOOD**

- A. Comply with Prod. Std., PS 1.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Electrical Component Mounting Boards:
  - 1. APA rated Exposure 1 or Exterior; panel grade CD or better.
  - 2. Fire retardant treated.
  - 3. Size as required for support and load condition, but not less than 13 mm (1/2 inch) thick.

## **2.3 ROUGH HARDWARE AND ADHESIVES:**

- A. Anchor Bolts:
  - 1. ASME 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. Washers

1. ASTM F844.
  2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.
- C. Screws:
1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
  2. Wood to Steel: ASTM C954, or ASTM C1002.
- D. Nails:
1. Size and type best suited for purpose unless noted otherwise. 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. Masonry: Type I, Style 27.
    - e. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:**

- A. Conform to applicable requirements of the following:
1. NDS, Conventional Wood Frame Construction for nailing and framing unless specified otherwise.
  2. APA for installation of plywood or structural use panels.
- B. Fasteners:
1. 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 bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 600 mm (24 inch) intervals between end bolts. Use clips to beam flanges.
  2. 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.
3. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.
- C. Cut notch, or bore in accordance with NDS, Conventional Wood Frame Construction for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.
- D. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where indicated and wherever required to provide proper support for anchoring to walls, floor, ceilings and similar conditions.
  2. Use longest lengths practicable.
  3. All concealed wood blocking to be fire retardant treated.
  4. Layers of Blocking or Plates:
    - a. Stagger end joints between upper and lower pieces.
    - b. Nail at ends and not over 600 mm (24 inches) between ends.
    - c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.
- E. Electrical Component Mounting Boards:
1. Use plywood sheathing as specified.
  2. Lay panels with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
  3. Set nails not less than 9 mm (3/8 inch) from edges and anchor securely to substrate.
  4. Install 50 mm by 100 mm (2 inch by 4 inch) blocking spiked between joists, rafters and studs to support edge or end joints of panels.

--- E N D ---



**SECTION 06 20 00  
FINISH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies interior custom millwork.
- B. Items specified.
  - 1. Moldings and Trim
  - 2. Architectural Casework

**1.2 RELATED WORK**

- A. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.
- B. Countertops to be mounted on Casework: Section 06 61 13, SOLID SURFACING FABRICATIONS.
- C. Wood doors: Section 08 14 00, WOOD DOORS.
- D. Color and texture 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. 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:
  - 1. Plastic laminate finished plywood or particleboard, 150 mm by 300 mm (six by twelve inches).

**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 Resident Engineer. Store at a minimum temperature of 21<sup>0</sup>C (70<sup>0</sup>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-05.....Structural Steel
  - A53-06 .....Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless
  - A167-99 (R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
  - B26/B26M-05 .....Aluminum-Alloy Sand Castings
  - B221-06 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  - E84-07.....Surface Burning Characteristics of Building Materials
  - F436-07.....Hardened Steel Washers
- 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):
  - HP1-04.....Hardwood and Decorative Plywood
- F. National Particleboard Association (NPA):
  - A208.1-99 .....Wood Particleboard
- G. American Society of Mechanical Engineers (ASME):
  - B18.2.1-96(R2005) .....Square and Hex Bolts and Screws (Inch Series)
- H. American Wood-Preservers' Association (AWPA):
  - AWPA C1-03.....All Timber Products – Preservative Treatment by Pressure Processes
- I. Architectural Woodwork Institute (AWI):
  - AWS-09 .....Architectural Woodwork Standards
- J. National Electrical Manufacturers Association (NEMA):
  - LD 3-05.....High-Pressure Decorative Laminates

LD 3.1-95.....Application, Fabrication and Installation of High-Pressure  
Decorative Laminates

K. U.S. Department of Commerce, Product Standard (PS):

PS1-95.....Construction and Industrial Plywood

PS20-05.....American Softwood Lumber Standard

L. Military Specification (Mil. Spec):

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

M. 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.

D. Softwood: PS-20, exposed to view appearance grades:

1. Use C select or D select, vertical grain for transparent finish including stain transparent finish.

- 2. Use Prime for painted or opaque finish.
- E. Use edge grain Wood members exposed to weather.

## **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, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.
  - 4. Plastic Laminate Plywood Cores:
    - a. Exterior Type, and species group.
    - b. Veneer Grade: A-C.
  - 5. Shelving Plywood:
    - a. Interior Type, any species group.
    - b. Veneer Grade: A-B or B-C.
  - 6. Other: As specified for item.

## **2.3 PARTICLEBOARD**

- A. NPA A208.1
- B. Plastic Laminate Particleboard Cores:
  - 1. Use Type 1, Grade 1-M-3, or Type 2, Grade 2-M-2, unless otherwise specified.
  - 2. Use Type 2, Grade 2-M-2, exterior bond, for tops with sinks.
- C. General Use: Type 1, Grade 1-M-3 or Type 2, Grade 2-M-2.

## **2.4 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. Backing sheet on bottom of plastic laminate covered wood tops: Backer, Type BLK.
- D. Post Forming Fabrication, Decorative Surfaces: Post forming, Type HGP.

## 2.5 ADHESIVE

- A. For Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

## 2.6 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. Galvanized where specified.
2. Use galvanized coating on ferrous metal for exterior work unless non-ferrous metals or stainless is used.
3. 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. Door/Drawer Pulls: B02011, in form of wire "U", 100 mm (4 inch) centers.
  - b. Drawer Slides: B05091 (self-closing). For drawers less than 75 mm (3 inches) deep B05092 may be used.
  - c. Adjustable Shelf Standards: B4071 with shelf rest B04083.
  - d. Concealed Hinges: B1601, minimum 110 degree opening.
  - e. Vertical Slotted Shelf Standard: B04103 with shelf brackets B04113, sized for shelf depth.
2. Cabinet Locks: ANSI A156.11.
  - a. Drawers and Hinged Door: E07262.
  - b. Sliding Door: E07162.
3. 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.
  - d. Handrail Brackets: L03081 or L03101.
    - 1) Cast Aluminum, satin polished finish.
    - 2) Cast Malleable Iron, japanned or enamel finish.

4. Grommets: Standard plastic or rubber grommets for cut-outs, in color to match adjacent surface.

## **2.7 MOISTURE CONTENT**

- A. Moisture content of lumber and millwork at time of delivery to site.
  1. Interior finish lumber, trim, and millwork 32 mm (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.

## **2.8 FABRICATION**

- A. General:
  1. Except as otherwise specified, use AWS 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 13 mm (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 4 m (14 feet) in length from one piece of lumber, back channeled and molded as 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, unless indicated otherwise. Use plastic molded edge strips on 19 mm (3/4-inch) molded thick or thinner core material.
    - c. Provide plastic backing sheet on underside of countertops and cabinetry
    - d. Use backing sheet on concealed large panel surface when decorative face does not occur including back splashes and end splashes of countertops..
    - e. Provide plastic backer sheet or paint with two coats of exterior paint all concealed edges of counters, shelves or panels not indicated to be covered with decorative plastic laminate.
- B. Architectural Casework:

1. Fabricate to requirements of AWS, Section 10, Custom Grade.
2. Finishes:
  - a. Exposed and Semi-Exposed surfaces: Red Oak, stain to match doors.
  - b. Concealed: Stained red oak; may be economy grade.
3. Construction Type: A, Flush Overlay.
4. Edge Profile: Square Inlet.
5. Use softwood for structural framing member's standard sizes, space not over 400 mm (16 inches) on center.
6. Use red oak for exposed hardwood trim and edging.
7. Use drawer guides on drawers with pulls.
8. Use pulls and concealed hinges on doors.
9. Use adjustable shelf standards with shelf rests.
10. Provide cut outs for electrical devices and outlets.

### **PART 3 - EXECUTION**

#### **3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain work areas and storage areas to a minimum temperature of 21<sup>0</sup>C (70<sup>0</sup>F) 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. Architectural Casework:

1. Casework units to floor and to wall.
  - a. Provide solid blocking in all walls where cabinets are attached.
2. Secure counter top to supporting casework bases.
3. Conceal fasteners on public side. Exposed fasteners permitted under counter top and in knee spaces on staff side.

**3.3 REPAIR AND CLEANING**

- A. Repair all damage to finishes to the satisfaction of the Resident Engineer. If surface cannot be repaired successfully, replace the surface. If the surface cannot be replaced without damage to the unit, replace the entire unit.
- B. Clear units before Substantial Completion, including inside drawer and enclose shelving spaces.

--- END ---

**SECTION 06 61 13**  
**SOLID SURFACING FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies solid polymer counter tops, window stools, and shower compartment material requirements.

**1.2 RELATED SECTIONS**

- A. Section 06 20 00, FINISH CARPENTRY.

**1.3 SUBMITTALS**

- A. Product data: Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Shop drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- C. Samples: Submit minimum 6" x 6" (50 mm x 50 mm) samples, in specified color and gloss. Where variation occurs in the pattern or color, provide a sample or samples showing the full range. Approved samples will be retained as standards for work.
- D. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

**1.4 QUALITY ASSURANCE**

- A. Fabricator/installer shall be approved by solid polymer manufacturer.

**1.5 DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver no components to project site until areas are ready for installation. Store components indoors prior to installation.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

**1.6 WARRANTY**

- A. Provide manufacturer's 10 year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Damage caused by physical or chemical abuse or damage from excessive heat is excluded.

**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):

- D 256 .....Standard Test Methods for Determining the Izod Pendulum  
Impact Resistance of Plastics.
- D 570 .....Standard Test Method for Water Absorption of Plastics.
- D 638Standard Test Method for Tensile Properties of Plastics.
- D 696 .....Standard Test Method for Coefficient of Linear Thermal  
Expansion of Plastics Between -30°C and 30°C With a Vitreous  
Silica Dilatometer.
- D 785 .....Standard Test Method for Rockwell Hardness of Plastics and  
Electrical Insulating Materials.
- D 790 .....Standard Test Methods for Flexural Properties of Unreinforced  
and Reinforced Plastics and Electrical Insulating Materials.
- D 2583 .....Standard Test Method for Indentation Hardness of Rigid Plastics  
by Means of a Barcol Impressor.
- E 84.....Standard Test Method for Surface Burning Characteristics of  
Building Materials.
- G 21 .....Standard Practice for Determining Resistance of Synthetic  
Polymeric Materials to Fungi.
- C. American National Standards Institute (ANSI):
  - Z124.3 .....Standard for Plastic Lavatories.
  - Z124.6 .....Standard for Plastic Sinks.
- D. National Electrical Manufacturers Association (NEMA):
  - LD 3-05 .....High-Pressure Decorative Laminates

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS/PRODUCTS**

- A. Basis of Design: Corian by DuPont: [www.corian.com](http://www.corian.com)

### **2.2 MATERIALS**

- A. Solid Polymer Surfaces must be homogeneous non-porous filled acrylic and aluminum trihydrate filler and pigment. Body color and pattern must be through color and pattern; not coated, laminated or of composite construction. Must meet the requirements of ANSI Z124.3 & .6, Type Six.
  1. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and polishing.
- B. Performance characteristics:

1. Tensile Strength: 6000 psi min per ASTM D 638
  2. Tensile Modulus:  $1.5 \times 10^6$  psi min per ASTM D 638
  3. Flexural Strength: 10000 psi min per ASTM D 790.
  4. Flexural Modulus:  $1.2 \times 10^6$  psi min per ASTM D 790
  5. Elongation: 0.4% min. per ASTM D 638
  6. Thermal Expansion:  $1.80 \times 10^{-5}$  in/in/deg F. max. per ASTM D696
  7. Color Stability: No change, 100 hours min. per NEMA LD3-3.10.
  8. Wear and Cleanability: Passes ANSI Z124.3
  9. Boiling water Surface Resistance: No Change per NEMA LD3-3.05
  10. High Temperature Resistance: No Change per NEMA LD3-3.06
  11. Impact Resistance: Notched Izod Gardner 0.24 ft.-lbs. min. per ASTM D256, Method A.
  12. Stain Resistance: Passes ANSI Z124.3
  13. Fungi: No Attack per ASTM G21.
  14. Specific Gravity: 1.7 min
  15. Water Absorption: maximum 0.06% of weight long term for 1/2 inch per ASTM D 570
  16. Flammability, ASTM E84,
    - a. Flame spread: 25 max
    - b. Smoke Developed: 25 max
- C. Finish: To be chosen by Architect from manufacturer's full range.

## 2.3 COMPONENTS

- A. Countertops and Window Stools: Solid surfacing sheet or plastic resin casting self-supporting over structural members.
1. Flat Sheet Thickness: 1/2 inch (12 mm), minimum.
  2. Exposed Edge Treatment: Built up to minimum 1½ inch (38 mm) thick unless indicated otherwise on Drawings; radiused edge.

## 2.4 ACCESSORIES

- A. Joint adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in color matching or clear formulations.

## **2.5 FABRICATIONS**

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- B. Counter tops eight feet long and under shall be formed of a single piece (no joints).
- C. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2" wide reinforcing strip of solid polymer material under each joint.
- D. Provide holes and cutouts for scheduled penetrations, including for plumbing fixtures and fittings, as indicated on the drawings.
- E. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.
- F. Ease all exposed edges.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify adequacy of backing and support framing.

### **3.2 INSTALLATION**

- A. Install components plumb and level, in accordance with approved shop drawings and product installation details.
- B. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on date of Substantial Completion.

### **3.3 TRAINING**

- A. Fabricator/Installer is to provide a commercial care and maintenance video, review maintenance procedures and warranty details with the Owner's maintenance personnel upon completion of project.

### **3.4 CLEANING AND PROTECTION**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.
- B. Protect surfaces from damage until date of Substantial Completion. Repair or replace damaged work that cannot be repaired to Owner and Architect/Engineer's satisfaction.

--- E N D ---

**SECTION 06 64 19**  
**DECORATIVE TRANSLUCENT PLASTIC PANELS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies multilayer, decorative translucent plastic polymer panels.

**1.2 RELATED SECTIONS**

- A. Section 06 20 00, FINISH CARPENTRY.
- B. Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's literature and data including product description, fabrication information, and compliance with specified performance requirements..
- C. Shop drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- D. Samples: Submit minimum 6" x 6" (50 mm x 50 mm) samples, in specified color and gloss. Where variation occurs in the pattern or color, provide a sample or samples showing the full range. Approved samples will be retained as standards for work.
- E. Certifications: Show compliance with requirements of this section including test reports.
- F. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer: Company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.
- B. Fabricator/installer familiar with decorative translucent plastic sheets and their fabrication.

**1.5 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install decorative translucent plastic sheets until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

## **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):
  - D1929 .....Standard Test Method for Determining Ignition Temperature of Plastics
  - D3763 .....Standard Test Method for High Speed Puncture Properties of Plastics Using Load and Displacement Sensors
  - D5116 .....Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
  - D6670 .....Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
  - E 84 .....Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. Code of Federal Regulations (CFR):
  - 16 CFR 1201 .....Safety Standard for Architectural Glazing Materials; 1977, with 1984 Revision.
- D. National Fire Protection Association (NFPA):
  - 286 .....Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL DESCRIPTION**

- A. Laminated polyester polymer based sheets with interlayers contain decorative organics, papers, fabrics, and colors.

### **2.2 MATERIALS**

- A. Engineered, monolithic sheets formed of polyesters, bonding agents and various decorative interlayer materials conforming to the following:
  - 1. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.

2. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1”.
3. Room Corner Burn Test (NFPA 286). Material must meet requirements as described in International Building Code, 2009.
4. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
5. Safety Glazing. Material must attain a Class A impact rating in accordance with 16 CFR 1201, Class II, at thickness used in the Project.
6. Dynamic environmental testing (ASTM D 5116 and D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard™ Indoor Air Quality certified.
7. Panels must be produced from a minimum of 40% post-industrial recycle content. This recycle content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).
8. Building Approvals: Products must be acceptable to local building officials in the city or locality where they are installed.

## **2.3 ACCESSORY MATERIALS**

- A. Adhesives, bonding agents and cleaners shall be recommended by the plastic sheet manufacturer for use with the material.
- B. Sealants, gaskets and other accessories shall be recommended by the plastic sheet manufacturer for use with the material.

## **2.4 FABRICATIONS**

- A. Comply with manufacturer’s written recommendations for fabrication.
- B. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- C. Ease all exposed edges.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify substrate or receiving frames are satisfactory to permit proper installation.

### **3.2 INSTALLATION**

- A. Comply with manufacturer’s written recommendation.

- B. Install components plumb and level, in accordance with approved shop drawings and product installation details.
- C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
- D. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

### **3.3 CLEANING AND PROTECTION**

- A. Keep components and hands clean during installation.
- B. Clean adjacent surfaces or frames affected by the installation.
- C. Remove adhesives, sealants and other stains. Use only cleaning agents recommended by the manufacturer of each surface material being cleaned. Components shall be clean on date of Substantial Completion.
- D. Protect surfaces from damage until date of Substantial Completion. Repair or replace damaged work that cannot be repaired to Owner and Architect/Engineer's satisfaction.

--- E N D ---

**SECTION 07 14 16**  
**COLD FLUID-APPLIED WATERPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies materials and workmanship for fluid-applied polymer modified asphalt below waterproofing on concrete and masonry surfaces and related materials.

**1.2 RELATED WORK**

- A. Insulation installed in conjunction with fluid applied waterproofing: Section 07 21 13, THERMAL INSULATION
- B. Excavation and fill applied over fluid applied waterproofing and drainage mat: 31 20 00, EARTH MOVING.
- C. Placement of drainage in relation to waterproofing: Section 33 46 13, FOUNDATION DRAINAGE.

**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. Product description.
  - 2. Application instructions.

**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. American Society for Testing and Materials (ASTM):
  - C836-06 .....Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - D226-06 .....Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
  - D1227-95 (R2007).....Emulsified Asphalt Used as a Protective Coating for Roofing
  - D4491-99a(2004) e1 .....Standard Test Methods for Water Permeability of Geotextiles by Permittivity

D4716-07 .....Standard Test Method for Determining the (In-plane) Flow Rate  
per Unit Width and Hydraulic Transmissivity of a Geosynthetic  
Using a Constant Head

## **PART 2 - PRODUCTS**

### **2.1 EMULSIFIED ASPHALT:**

- A. Liquid applied, modified bitumen system conforming to ASTM D836.
- B. High Build: Two coat system, with fiber reinforcing.
- C. Low VOC: Not greater than 75 g/l.
- D. Maximum Permeability: ASTM E 96, Procedure B: not greater than 0.1 perms.

### **2.2 DRAINAGE MAT:**

- A. Non-Woven Geotextile
- B. Minimum Water Flow Rate: 100 l/min/m (gal/min/sf) tested according to ASTM D4491.
- C. Minimum Core Flow Rate: 5 l/min/m (gal/min/sf) tested according to ASTM D4716.
- D. Maximum Thickness: 16 mm (5/8 inch).

### **2.3 ACCESSORIES**

- A. Provide primers, fillers, sealants, flashing, cants, and other accessories as recommended by the membrane manufacturer.

## **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 be damp.
- E. Surfaces shall be approved by Resident Engineer before dampproofing is applied.

### **3.2 APPLICATION:**

- A. Conform to the manufacturer's recommendations and the following.
- B. Schedule application so that drying will be accomplished prior to backfilling and so that backfilling will be accomplished as soon as possible after drying.
- C. Apply when the ambient temperature is above 4°C (40°F) and rising. Do not apply if the temperature is expected to fall below 4°C (40°F).
- D. Apply in accordance with manufacturer's printed instructions unless specified otherwise.
- E. Apply each coat at the rate of not less than 1 L/m<sup>2</sup> (2-1/2 gallons per 100 square feet) and allow not less than 24 hours drying time after application.

- F. Apply first coat by brush, spray, or mop and allow to dry.
- G. Apply fiber reinforcement as recommended.
- H. Apply second coat by brush or mop and allow to dry.
- I. Inspect for holidays; recoat holidays. The finish dampproofing shall be free of holidays.
- J. Install drainage matt in relation to board insulation as recommended by manufacturers' of fluid applied waterproofing, drainage mat, and insulation.

### **3.3 PROTECTIVE COVERING:**

- A. During filling (earthwork) operations, provide protective covering that is acceptable to the fluid applied waterproofing and drainage mat manufacturer. Drainage mat or insulation may be used, if so recommended by the manufacturers. If neither is recommended, provide additional cover board that is acceptable to the fluid applied waterproofing manufacturer.

### **3.4 LOCATION:**

- A. Below grade walls of occupied spaces and as indicated.

- - - END - - -



## **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. Waterproofing and drainage mat installed in relation to below grade insulation: Section 07 14 16, COLD FLUID-APPLIED WATERPROOFING.
- B. Air barrier installation in relation to cavity insulation in masonry walls: SECTION 07 27 13, AIR BARRIERS.
- C. Insulation in connection with roofing and waterproofing: Section 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.

#### **1.3 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES .
- B. Manufacturer's Literature and Data:
  - 1. 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):
  - C553-02 .....Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
  - C578-07 .....Rigid, Cellular Polystyrene Thermal Insulation

- C591-05 ..... Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
- C665-06 ..... Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- C954-04 ..... 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
- C1002-04 ..... 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
- E84-07..... Surface Burning Characteristics of Building Materials
- F1667-05..... 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
Fiber-Glass Batt	
Polyisocyanurate/polyurethane	
Rigid foam	9 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 RIGID MASONRY CAVITY WALL INSULATION:**

- A. Provide either:
  1. Polyurethane or Polyisocyanurate Board: ASTM C591, Type I, faced with a vapor retarder having a perm rating of not more than 0.5.
  2. Extruded Polystyrene Board: ASTM C578, Type X.

- B. Thermal Performance: Not less than  $R=6$  (aged) for 25 mm (1 inch) of thickness.

### **2.3 RIGID RAIN SCREEN CAVITY WALL INSULATION:**

- A. Extruded Polystyrene Board: ASTM C578, Type X.
- B. Thermal Performance: Not less than  $R=5$  for 25 mm (1 inch) of thickness.

### **2.4 BELOW GRADE, PERIMETER INSULATION (IN CONTACT WITH SOIL):**

- A. Extruded Polystyrene Board: ASTM C578
  - 1. Vertical Applications: Type IV, V, VI, or VII.
  - 2. Horizontal Applications (below slab): Type V, VI, or VII.
- B. Product must be recommended by the manufacturer for below grade, earth-loaded applications.
- C. Thermal Performance: Not less than  $R=5$  for 25 mm (1 inch) of thickness.

### **2.5 EXTERIOR FRAMING OR FURRING INSULATION:**

- A. Batt or Blanket: Optional.
- B. Mineral Fiber: ASTM C665, Type I, Unfaced.
- C. Thermal Performance: Not less than  $R=4$  per 25 mm (1 inch) of thickness.

### **2.6 ACOUSTICAL INSULATION:**

- A. Mineral Fiber Batt or Blankets: ASTM C665, Type I, Unfaced.
- B. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.
- C. Thickness as shown; of widths and lengths to fit tight against framing.

### **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.
- B. Asphalt: ASTM D312, Type III or IV.

### **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. Coordinate installation of insulation with vapor barrier when provided under other Sections of this Specification.
- B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.
- C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.
- D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

**3.2 MASONRY CAVITY WALLS:**

- A. Provide batt insulation in framing cavities as described in this section.
- B. Mount rigid insulation on exterior faces of sheathing or backup masonry.
- C. Bond mineral fiberboard, polyurethane or polyisocyanurate board, and perlite board to surfaces with adhesive as recommended by insulation manufacturer.
- D. Fill or tape joints between rigid insulation board as recommended by manufacturer.

**3.3 PERIMETER INSULATION:**

- A. Vertical insulation:
  - 1. Coordinate with installation of bituminous waterproofing.
  - 2. Fill joints of insulation with same material used for bonding.
  - 3. Bond polystyrene board to surfaces with adhesive mixed and applied in accordance with recommendations of insulation manufacturer.

**3.4 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:**

- A. Coordinate installation of insulation with vapor barrier when provided under other Sections of this Specification.
- B. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.
- C. Fasten blanket insulation between metal studs or framing using impaling pins.

**3.5 ACOUSTICAL INSULATION:**

- A. Fasten blanket insulation between metal studs and wall furring with impaling pins.
- B. Where unable to use impaling pins, hold insulation in place with pressure sensitive tape or adhesive.

- C. 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.
- D. Do not compress insulation below required thickness except where embedded items prevent required thickness.

- - - END - - -



## **SECTION 07 25 13 INTERIOR VAPOR BARRIER**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section specifies vapor retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor-resistant and air-tight.

#### **1.2 SUBMITTALS**

- A. Product Data: Provide data on material characteristics.
- B. Manufacturer's Installation Instructions: Indicate preparation.

#### **1.3 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

#### **1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Association of Textile Chemists and Colorists (AATCC)  
Test Method 127-03.....Water Resistance: Hydrostatic Pressure Test.
- C. American Society for Testing and Materials (ASTM):  
D1970-01 ..... Standard Specification for Self-Adhering Polymer Modified  
Bituminous Sheet Materials Used as Steep Roofing  
Underlayment for Ice Dam Protection; 2001.  
D4397-02 ..... Standard Specification for Polyethylene Sheeting for  
Construction, Industrial, and Agricultural Applications; 2002.  
E84-07..... Standard Test Method for Surface Burning Characteristics of  
Building Materials; 2007.

### **PART 2 - PRODUCTS**

#### **2.1 WEATHER BARRIER ASSEMBLIES**

- A. Interior Vapor Retarder: On inside face of studs of exterior walls, under cladding, use mechanically fastened vapor retarder sheet.

#### **2.2 SHEET VAPOR BARRIER MATERIALS**

- A. Vapor Retarder Sheet: ASTM D 4397 polyethylene film reinforced with glass fiber square mesh, clear.

1. Thickness: 10 mil (0.25 mm).
2. Water Vapor Permeance: As required by referenced standard for thickness specified.

### **2.3 ACCESSORIES**

- A. Self-Adhesive Sheet Flashing: ASTM D 1970.
- B. Provide all primers, adhesives, sealers, tapes and other accessories as recommended by the manufacturer to properly install the membrane including sealing all edges and joints.
- C. Thinners and Cleaners: As recommended by material manufacturer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

### **3.2 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Prepares surfaces as recommended by the membrane manufacturer.

### **3.3 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Vapor Retarders: Install continuous air-tight barrier over surfaces indicated, with sealed seams and sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Mechanically Fastened Sheets - Vapor Retarder On Interior:
  1. When insulation is to be installed in assembly, install vapor retarder over insulation.
  2. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making air-tight seal.
  3. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
  4. Seal entire perimeter to structure, window and door frames, and other penetrations.
  5. Where conduit, pipes, wires, ducts, outlet boxes, and other items are installed in insulation cavity, pass vapor retarder sheet behind item but over insulation and maintain air-tight seal.

### **3.4 PROTECTION**

- A. Cover vapor barrier immediately with finish material to prevent damage to the barrier.

--- END ---

## **SECTION 07 26 16 BELOW GRADE VAPOR RETARDER**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. Below grade vapor retarder.

#### **1.2 RELATED SECTIONS**

- A. Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Section 31 20 00, EARTH MOVING.

#### **1.3 SUBMITTALS**

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- B. Samples: Submit samples of underslab vapor retarder to be used.

#### **1.4 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place when substrate is wet.

#### **1.5 COORDINATION**

- A. Coordinate placement of penetrating items.

#### **1.6 APPLICABLE PUBLICATIONS:**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - E1643 -05.....Standard Practice for Installation of Water Vapor Retarders  
Used in Contact with Earth or Granular Fill under Concrete  
Slabs.
  - E1745-04.....Standard Specification for Plastic Water Vapor Retarders Used  
in Contact with Soil or Granular Fill under Concrete Slabs.

### **PART 2 - PRODUCTS**

#### **2.1 UNDERSLAB VAPOR RETARDER:**

- A. Construction: cross laminated multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent. Single ply polyethylene is prohibited.
- B. Compliance: ASTM E 1745, Class A with a permeance of less than .01 perms after mandatory conditioning tests per ASTM E 1745: 7.1.1 – 7.1.5.
- C. Applicability: Stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs.

- D. Thickness: 15 mil thick, minimum
- E. Acceptable products include, but are not limited to:
  - 1. Raven Industries Inc.; Product Vapor Block 15: [www.ravenefd.com](http://www.ravenefd.com).
  - 2. Stego Industries, LLC; Product Strego Wrap 15: [www.stegoindustries.com](http://www.stegoindustries.com).
  - 3. W.R. Meadows, Inc; Product Perminator 15: [www.wrmeadows.com](http://www.wrmeadows.com).
  - 4. Reef Industries; Product Vaporgaurd.

## **2.2 ACCESSORIES**

- A. Provide tapes, adhesives and other accessory materials as recommended by the vapor barrier manufacturer for proper installation.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Verify requirements for concrete cover of reinforcing will be met.

### **3.2 PREPARATION**

- A. Verify that all penetrating items are in place.

### **3.3 INSTALLATION**

- A. Install vapor retarder under interior slabs on grade in conformance with ASTM E 1643. Lap joints minimum 6 inches (150 mm) and seal watertight by taping edges and ends. Repair damaged vapor retarder before pouring concrete.
- B. Form vapor retarder around all penetrations and or otherwise seal to penetrating item.
  - 1. Place tape so that it will be fully covered by fill in final installation.
- C. Protect vapor retarder from damage during installation of fill.
- D. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches (150 mm) and seal watertight.

--- END ---

## **SECTION 07 27 13**

### **AIR BARRIERS**

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION:**

- A. Air Barrier: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls liquid water resistant and air-tight.

##### **1.2 SUBMITTALS**

- A. Product Data: Provide data on material characteristics and data showing conformance to the requirements of this section.
- B. Manufacturer's Installation Instructions: Indicate preparation.

##### **1.3 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

##### **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 Association of Textile Chemists and Colorists (AATCC)
  - Test Method 127-03.....Water Resistance: Hydrostatic Pressure Test.
- C. American Society for Testing And Materials (ASTM):
  - D1970-01 ..... Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
  - D882-02 .....Standard Test Method for Tensile Properties of Thin Plastic Sheeting
  - D903 .....Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
  - D1117-01 .....Standard Guide for Evaluating Nonwoven Fabrics
  - E84-07.....Standard Test Method for Surface Burning Characteristics of Building Materials.
  - E96/E 96M-05.....Standard Test Methods for Water Vapor Transmission of Materials.
  - E1677-05.....Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls

## E2178-03.....Standard Test Method for Air Permeance of Building Materials

**PART 2 - PRODUCTS****2.1 AIR BARRIER MATERIALS****A. Air Barrier Sheet, Mechanically Fastened (for use at gypsum sheathing):**

1. General Description: Non-woven, spun-bonded, non-perforated, polyethylene sheet with an aluminum coating and a lacquer on one face.
  - a. Assembly Performance: Provide a continuous air barrier assembly that has an air leakage not to exceed 0.0008 cfm/sq. ft. of surface area under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.004 L/s. x sq. m. of surface area at 75 Pa) when tested in accordance with ASTM E2357.
2. Classification: ASTM E 1677, Type I.
3. Air Penetration: 0.001 cfm/ft<sup>2</sup> at 1.57 psf, when tested in accordance with ASTM E 2178.
4. Water Vapor Permeance: 5 perms (287 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
5. Water Vapor Permeance: 36 perms (2068 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
6. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 9 months weather exposure.
7. Tensile Strength: 29/27 lbs/in., when tested in accordance with ASTM D 882, Method A.
8. Tear Resistance: 12/7 lbs., when tested in accordance with ASTM D 1117.
9. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 4 months weather exposure.
10. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 50 or less, when tested in accordance with ASTM E84.

**B. Fluid Applied, Vapor Impermeable Membrane (for application to CUM walls):**

1. General Description: A fluid-applied, vapor impermeable, two- component, cold-vulcanized, synthetic rubber.
2. Performance Requirements
  - a. Assembly Performance: Provide a continuous air barrier assembly that has an air leakage not to exceed 0.0008 cfm/sq. ft. of surface area under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.004 L/s. x sq. m. of surface area at 75 Pa) when tested in accordance with ASTM E2357.

- b. Membrane Air Permeance: ASTM E2178: Not to exceed 0.0002 cfm/sq. ft. under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.001 L/s. x sq. m. @ 75 Pa)
- c. Membrane Vapor Permeance: ASTM E96, Method B: not less than 0.08 perms (4.6 ng/Pa.s.m<sup>2</sup>)
- d. Peel Adhesion: ASTM D903: min. 5 pli (880 N/m) to concrete/CMU
- e. UV Exposure Limit: At least 60 calendar days

## **2.2 ACCESSORIES**

- A. Provide all primers, adhesives, sealers, tapes, flexible sheet flashing, rigid metal flashing, and other accessories as recommended by the manufacturer to properly install the membrane including sealing all edges, penetrations, and joints.
- B. Self-Adhesive Sheet Flashing: ASTM D 1970.
- C. Thinners and Cleaners: As recommended by material manufacturer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

### **3.2 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Prepares surfaces as recommended by the membrane manufacturer.
- C. Prepare joints and gaps in substrate as recommended by membrane manufacturer.

### **3.3 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air-tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces. Apply membrane in full contact around protrusions such as masonry ties.
- C. Do not cover air barrier until observed and approved by the Resident Engineer.
- D. Install additional liquid applied, flexible sheet membrane, and rigid metal flashing as recommended by the membrane manufacturer.
- E. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- F. Correct deficiencies or damage to the primary membrane or to any of the accessory flashing or other accessories that may reduce the performance of the air barrier. Repair or replace the air

barrier that does not comply with requirements. When necessary, repair substrates and reapply air barrier components.

### **3.4 CLEANING AND PROTECTION**

- A. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. Remove masking materials after installation.
- C. Protect air barrier from damage until permanently encased in final construction.
- D. Do not leave materials exposed to weather longer than recommended by manufacturer

- - - E N D - - -

**SECTION 07 42 64**  
**METAL COMPOSITE MATERIAL WALL PANELS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.

**1.2 RELATED REQUIREMENTS**

- A. Sealant: Section 07 92 00, JOINT SEALERS.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, and other trade contractors.
  - 1. Coordinate building framing in relation to composite wall panel system.
  - 2. Coordinate installation of building air and water barrier behind composite wall panel system.
  - 3. Coordinate window, door and louver, and other openings and penetrations of composite wall panel system.

**1.4 SUBMITTALS**

- A. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
  - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
  - 2. Storage and handling requirements and recommendations.
  - 3. Fabrication instructions and recommendations.
  - 4. Sample warranty for finish, as specified herein.
- B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
  - 4. Specimen warranty for wall system, as specified herein.
- C. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
  - 1. Indicate panel numbering system.
  - 2. Differentiate between shop and field fabrication.

3. Indicate substrates and adjacent work with which the wall system must be coordinated.
  4. Include large-scale details of anchorages and connecting elements.
  5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10 ).
- D. Installer's Qualifications.
- E. Engineer's Qualifications.
- F. Design Calculations and Drawings:
1. Connection calculations, if required.
- G. Maintenance Data: Care of finishes and warranty requirements.
- H. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

## **1.5 QUALITY ASSURANCE**

- A. Design Engineer: Systems and all details shall be prepared on the supervision of a licensed engineer with experience in rain screen panel design. Engineer shall prepare and sign calculations showing the structural adequacy of the system and the proper hydraulic functioning of the rain screen.
- B. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- C. Wall System Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.
1. With not less than three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified in this section.
1. With minimum 3 years of documented experience.
  2. Approved by wall system manufacturer.
- E. Mock-Up: Provide a mock-up for evaluation of fabrication workmanship.
1. Locate where directed.
  2. Provide panels finished as specified.
  3. Accepted mock-up may remain as part of the Work.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
1. Protect finishes by applying heavy duty removable plastic film during production.
  2. Package for protection against transportation damage.

3. Provide markings to identify components consistently with drawings.
  4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
1. Store in well ventilated space out of direct sunlight.
  2. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
  3. Store at a slope to ensure positive drainage of any accumulated water.
  4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
  5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

## **1.7 WARRANTY**

- A. MCM Sheet Manufacturer's Finish Warranty: Provide manufacturer's written warranty stating that the finish will perform as follows for minimum of 10 years:
1. No cracking, blistering or debonding.
  2. Chalking: No more than that represented by a No.8 rating based on ASTM D 4214.
  3. Color Retention: No fading or color change in excess of 5 Hunter color difference units, calculated in accordance with ASTM D 2244.
  4. Gloss Retention: Minimum of 30 percent gloss retention, when tested in accordance with ASTM D 523.

## **1.8 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 Association of Textile Chemists and Colorists (AATCC)  
Test Method 127-03.....Water Resistance: Hydrostatic Pressure Test.
- C. American Architectural Manufacturers Association (AAMA)  
508 ..... Voluntary Test Method and Specifications for Pressure  
Equalized Rain Screen Wall Cladding Systems.  
620 ..... Voluntary Specification High Performance Organic Coatings on  
Coil Coated Architectural Aluminum.

- 2605 ..... Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2005.
- A. American Society of Civil Engineers (ASCE):
- 7 ..... Minimum Design Loads for Buildings and Other Structures.
- D. American Society for Testing And Materials (ASTM):
- A 36/A 36M ..... Specification for Carbon Structural Steel; 2005.
- A 123/A 123M ..... Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.
- A 153/A 153M ..... Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.
- A 276 ..... Standard Specification for Stainless Steel Bars and Shapes; 2008a.
- A 480/A 480M ..... Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2008b.
- A 653/A 653M ..... Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009.
- A 666 ..... Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.
- A 792/A 792M ..... Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2006a.
- B 209 ..... Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- C 645 ..... Specification for Nonstructural Steel Framing Members.
- D 523 ..... Standard Test Method for Specular Gloss; 2008.
- D 1781 ..... Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2004).
- D 1929 ..... Standard Test Method for Determining Ignition Temperature of Plastics; 1996 (Reapproved 2001).
- D1970-01 ..... Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

- D 2244 .....Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates; 2009.
- D 3359 .....Standard Test Methods for Measuring Adhesion by Tape Tests.
- D 4145 .....Standard Test Method for Coating Flexibility of Prepainted Sheet; 1983 (Reapproved 2002).
- D 4214 .....Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2007.
- E 84..... Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.
- B. National Fire Protection Association (NFPA):
  - 285 .....Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

## **PART 2 - PRODUCTS**

### **2.1 SYSTEM DESCRIPTION**

- A. Completed system to consist of form metal composite material (MCM) panels mounted on an aluminum framing system.
- A. Composite metal panels may be by one manufacturer and wall framing system may be by another manufacturer or both panel and framing system may be by the same manufacture and may be factory integrated or fabricated at the site or in the shop.
- B. However, forming MCM panels shall take place in the shop or at the factory, not on site, except as permitted to allow for unique site conditions.
- C. Formed Panel Type: Route and Return
- D. Joint Type: Dry (or open)
- E. Completed installation shall function as a pressure equalized rain screen.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. General: Provide composite wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Structural Performance: Design composite wall panel system fabricated to withstand effects of indicated loads and stresses within limits and under conditions indicated below.
  - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed based on ASCE 7.

2. Limits of Deflection: Composite wall panel system shall withstand scheduled wind pressure with the following allowable deflection:
  - a. Maximum allowable deflection limited to  $L/175$  deflection of panel perimeter normal to plane of wall.
  - b. Maximum allowable deflection of panel stiffeners and aluminum panel material combined limited to  $L/60$ .
- C. Pressure Equalized Rain Screen Performance: Water Penetration: Pass AAMA 508 with a 15 psf pressure difference with an imperfect air and water barrier.
- D. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.

## 2.1 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials; core material free of voids and spaces; no foamed insulation material content.
  1. Overall Sheet Thickness: 4 mm (0.157 inches) (nominal).
  2. Face Sheet Thickness: 0.50 mm (0.020 inches), minimum.
  3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
  4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D 1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
  5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E 84.
  6. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater, when tested in accordance with ASTM D 1929.
  7. Factory Finish: Three coat fluoropolymer resin coating, approved by the coating manufacturer for the length of warranty specified for the project, and applied by coil manufacturing facility that specializes in coil applied finishes.
    - a. Conform to AAMA 2605.

- b. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
  - c. Color/Texture: As selected from manufacturer's standard selection. Color must be able match roofing panels and trim.
- B. Metal Framing Members: Include all sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
  - 1. Aluminum Extrusions: ASTM B 221, 6063 T5 or T6 Aluminum.
  - 2. Stainless Steel Sheet Components: ASTM A 480/A 480M.
  - 3. Sheet Steel Components: ASTM A 653/A 653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A 792/A 792M aluminum-zinc coated to AZ60/AZM180.
  - 4. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
- C. Anchors, Clips and Accessories:
  - 1. Stainless steel complying with ASTM A 480/A480M, ASTM A 276 or ASTM A 666.

## **2.2 FABRICATION**

- A. Fabricate panels under controlled shop conditions. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
  - 1. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
  - 2. Make panel lines, breaks, curves and angles sharp and true.
  - 3. Keep plane surfaces free from warp or buckle.
  - 4. Keep panel surfaces free of scratches or marks caused during fabrication.
- B. Fabricate panel to be installed such that fasteners are not exposed or exposed only deep within open joints.
- C. Provide corner and face reinforcement as necessary to ensure that panels will maintain shape and surface flatness.
  - 1. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify dimensions, tolerances, and interfaces with other work.

- B. Verify substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturers written instructions.
- C. If substrate preparation is the responsibility of another installer, notify General Contractor of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Protect adjacent work areas and finish surfaces from damage during installation.

### **3.3 INSTALLATION**

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
  - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
  - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
  - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
  - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.

- H. Where indicated in shop drawings and only where indicated in shop drawings, install sealant as recommended by panel and sealant manufacturer.
- I. Replace damaged products.
  - 1. Exception: Field repairs of minor damage to finishes are permitted only when approved in writing by Architect, panel manufacturer, and fabricator and only where the repair is not discernible when viewed at distance of 10 feet (3000 mm) under all typical light conditions experienced at the project

### **3.4 CLEANING**

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

### **3.5 PROTECTION**

- A. Protect installed panel system from damage during construction.

- - E N D - -



**SECTION 07 54 23**  
**THERMOPLASTIC POLYOLEFIN (TPO) ROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Thermoplastic Polyolefin (TPO) sheet roofing adhered to roof deck.

**1.2 RELATED WORK**

- A. Treated wood framing, blocking, and nailers: Section 06 10 00, ROUGH CARPENTRY
- B. Sheet metal components and wind uplift requirements for roof-edge design: Section 07 60 00, FLASHING AND SHEET METAL.
- C. Miscellaneous items: Section 07 71 00, ROOF SPECIALTIES.

**1.3 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/Single-Ply Roofing Institute (ANSI/SPRI):
  - ANSI/SPRI ES-1-03 ..... Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
  - ANSI/SRPI WD-1 ..... Wind Design Standard for Roofing Assemblies.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
  - ASCE/SEI-7-10 ..... Minimum Design Loads for Buildings and Other Structures
- D. American Society for Testing and Materials (ASTM):
  - C67-09 ..... Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
  - C140-09 ..... Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
  - C1371-04 ..... Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
  - C1549-04 ..... Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
  - D4263 ..... Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
  - D4434-06 ..... Standard Specification for Poly (Vinyl Chloride) Sheet Roofing

- D6878-08 .....Standard Specification for Thermoplastic Polyolefin Based  
Sheet Roofing
- E108-10.....Standard Test Methods for Fire Tests of Roof Coverings
- E408-71(R2008) .....Standard Test Methods for Total Normal Emittance of Surfaces  
Using Inspection-Meter Techniques
- E1918-06.....Standard Test Method for Measuring Solar Reflectance of  
Horizontal and Low-Sloped Surfaces in the Field
- E1980-01 .....Standard Test Method for Measuring Solar Reflectance of  
Horizontal and Low-Sloped Surfaces in the Field
- E. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)  
ASHRAE 90.1-2007 .....Energy Standard for Buildings Except Low-Rise Residential  
Buildings, Appendix f.
- F. Cool Roof Rating Council:  
CRRC-1 .....Product Rating Program, [www.coolroofs.org](http://www.coolroofs.org)
- G. 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
- H. National Roofing Contractors Association:  
Roofing and Waterproofing Manual
- I. U.S. Department of Agriculture (USDA):  
USDA BioPreferred Catalog, [www.biopreferred.gov](http://www.biopreferred.gov)
- J. U.S. Department of Energy (DoE):  
Roof Products Qualified Product List, [www.energystar.gov](http://www.energystar.gov)

#### **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 have been successfully tested by a qualified independent testing and inspecting agency to meet the following requirements:

1. Energy Performance, Energy Star: Provide roofing system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

## 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. Inspector Qualifications: Inspection of work by third-party technical inspector or technical representative of manufacturer experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer, not engaged in the sale of products.
2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute (RCI), retained by the Contractor or the Manufacturer and approved by the Manufacturer.

### C. 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.

### D. 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 and ANSI/SPRI ES-1 and WD-1.

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.
  - a. Fire/Windstorm Classification: Class 1A-90.
  - b. Hail Resistance: MH.
- E. 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 Resident Engineer.
  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. Roof walkway.
  5. Fastening requirements.
  6. Application instructions.
- C. Samples:
  1. Nails and fasteners, each type.

- D. Shop Drawings: Include plans, sections, details, and attachments.
  - 1. Base flashings and terminations.
- E. Certificates:
  - 1. Indicating materials and method of application of roofing system meets requirements of FM Approvals "RoofNav" for specified fire/windstorm classification.
  - 2. Indicating compliance with energy performance requirement.
- F. Warranty: As specified.
- G. Documentation of supervisors' and inspectors' qualifications.
- H. Field reports of roofing inspector.
- I. Temporary protection plan. Include list of proposed temporary materials.
- J. 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**

- A. Roofing work subject to the terms of the Article "Warranty of Construction," FAR clause 52.246-21, except extend the warranty period to 20 years.

## **PART 2 - PRODUCTS**

### **2.1 TPO MEMBRANE ROOFING**

- A. TPO Sheet: ASTM D6878, internally fabric or scrim reinforced, 1.5 mm (60 mils) thick, with no backing.
  - 1. Color: White.

**2.2 ACCESSORIES:**

- A. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO 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. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured, ultra-violet light stabilized, walkway pads or rolls, approximately 5 mm (3/16 inch) thick, and acceptable to membrane roofing system manufacturer.
- G. 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 INSULATION**

- A. Polyisocyanurate Board: ASTM C1289, Type I, Class 2 or Type III.
- B. Minimum Aged R Value: 6 per inch of thickness.
- C. Thickness as indicated on Drawings.
- D. Provide tapered insulation of the same material to produce the indicated slopes.

**2.4 RECOVERY BOARD**

- A. Provide recovery board between insulation and membrane if recommended by roofing manufacturer and as recommended by the roofing membrane manufacturer for the specified warranty.

**2.5 FASTENERS**

- A. For mechanically anchoring insulation: As required by the roofing membrane manufacturer for the specified warranty.

**2.6 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.
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. Gypsum Board and Panel Adhesives: 50 g/L.
  - c. Multipurpose Construction Adhesives: 70 g/L.
  - d. Fiberglass Adhesives: 80 g/L.
  - e. Single-Ply Roof Membrane Adhesives: 250 g/L.
  - f. Other Adhesives: 250 g/L.
  - g. PVC Welding Compounds: 510 g/L.
  - h. Adhesive Primer for Plastic: 650 g/L.
  - i. Single-Ply Roof Membrane Sealants: 450 g/L.
  - j. Nonmembrane Roof Sealants: 300 g/L.
  - k. Sealant Primers for Nonporous Substrates: 250 g/L.
  - l. Sealant Primers for Porous Substrates: 775 g/L.

### **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 of adhesive.

### **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 Resident Engineer, for roof areas that are to remain intact, and that are subject to foot traffic and damage. Provide notches in sleepers to permit free drainage.

### **3.4 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 FMG 4450 and FMG 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 INSULATION AND RECOVERY BOARD**

- A. Install as recommended by manufacturer.
- B. Mechanically anchor insulation (and recovery board, if required) to roof deck. Conform to requirements of the manufacturer to meet the performance requirements of this Section.
- C. Unless noted otherwise, provide 2 percent (1/4 inch per foot) slope.
- D. Unless noted otherwise, provide 76 mm (3 inch) minimum thickness of insulation at low point of roof (e.g. at drains).

### **3.6 INSTALLATION OF TPO 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 TPO.
- 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 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 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.

### **3.7 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 TPO roof membrane.
    - c. Adhere the TPO roof membrane to the metal flashing with the membrane manufacturer's recommended adhesive.
  2. Turn down the metal drain flashing and TPO roof membrane into the drain body and install clamping ring and strainer.
- C. Installing TPO Base Flashing and Pipe Flashing:
  1. Install TPO 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 TPO 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 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 TPO 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 TPO 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 to roof membrane or flashing. Finish edge of lap with sealant as specified.

### **3.8 FLEXIBLE WALKWAYS**

- A. Use reinforced sheet not less than 900 mm (three feet) wide.
- B. Heat weld walkway sheet to roof sheet at edges. Weld area 50 mm (two inches) wide by the entire length of the walkway sheet.
- C. Finish edges of laps with sealants as specified.

### **3.9 FIELD QUALITY CONTROL:**

- A. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 10 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 Resident Engineer 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.
- B. 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.

- C. 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.

### **3.10 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.

- - - E N D - - -



## **SECTION 07 60 00 FLASHING AND SHEET METAL**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. Formed sheet metal work for wall and roof flashing, copings, roof edge metal, fascia, drainage specialties, and formed expansion joint covers are specified in this section.

#### **1.2 RELATED WORK**

- A. Through-wall flashing: Section 04 20 00, UNIT MASONRY.
- B. Single ply base flashing system: 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.
- C. Manufactured roof movement joints: Section 07 71 29, ROOF MOVEMENT JOINT COVERS
- D. Sealant compound and installation: Section 07 92 00, JOINT SEALANTS.
- E. Manufactured building movement joints: Section 07 95 13, EXPANSION JOINTS

#### **1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
  - 1. Miscellaneous Flashing
  - 2. Gutters and downspouts
- C. Certificates: Coating formulators approvals as specified.

#### **1.4 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer: Trained by ITI, having successfully completed the Architectural Sheet Metal module, and have at least three year experience in architectural sheet metal.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below for a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A167-99(R 2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
  - A653/A653M-06.....Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process

- B32-04 .....Solder Metal
- B209-06 .....Aluminum and Aluminum-Alloy Sheet and Plate
- B370-03 .....Copper Sheet and Strip for Building Construction
- D173-03 .....Bitumen-Saturated Cotton Fabrics Used in Roofing and  
Waterproofing
- D412-06 .....Vulcanized Rubber and Thermoplastic Elastomers-Tension
- D1187-97 (R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal
- D1784-06 .....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated  
Poly (Vinyl Chloride) (CPVC) Compounds
- D3656-04 .....Insect Screening and Louver Cloth Woven from Vinyl-Coated  
Glass Yarns
- D4586-07 .....Asphalt Roof Cement, Asbestos Free
- C. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI):
  - ES-1-2003 .....Wind Design Standard for Edge Systems Used with Low Slope  
Roofing Systems
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
  - Architectural Sheet Metal Manual (Sixth Edition, 2003).
- E. National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 500 Series .....Metal Finishes Manual
- E. American Architectural Manufacturers Association (AAMA):
  - 2604-05 .....Voluntary Specification, Performance Requirements and Test  
Procedures for High Performance Organic Coatings on  
Aluminum Extrusions and Panels.
- F. Federal Specification (Fed. Spec):
  - A-A-1925A .....Shield, Expansion; (Nail Anchors)
  - UU-B-790A .....Building Paper, Vegetable Fiber
- G. International Building Code (IBC):
  - 2003 Edition

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.
- B. Aluminum Sheet: ASTM B209, alloy 3003-H14 except alloy used for color anodized aluminum shall be as required to produce specified color. Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14.

- C. Galvanized Sheet: ASTM, A653.
- D. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- E. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m<sup>2</sup>( 6 lbs/100 sf).
- F. Bituminous Paint: ASTM D1187, Type I.
- G. Fasteners:
  - 1. Use galvanized steel or stainless steel for galvanized steel.
  - 2. Nails:
    - a. Minimum diameter for copper nails: 3 mm (0.109 inch).
    - b. Minimum diameter for aluminum nails 3 mm (0.105 inch).
    - c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
    - d. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
  - 3. Rivets: Not less than 3 mm (1/8 inch)diameter.
  - 4. Expansion Shields: Fed Spec A-A-1925A.
- H. Sealant: R-1 as specified in Section 07 92 00, JOINT SEALANTS.
- I. Roof Cement: ASTM D4586.

## **2.2 SHEET METAL THICKNESS**

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
  - 1. Concealed Locations (Built into Construction):
    - a. Stainless steel: 0.25 mm (0.010 inch) thick.
    - b. Galvanized steel: 0.5 mm (0.021 inch) thick.
  - 2. Exposed Locations: As indicated.

## **2.3 FABRICATION, GENERAL**

- A. Perform all work in accordance with SMACNA recommendations.
- B. Jointing:
  - 1. Joints shall conform to following requirements:
    - a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
    - b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
    - c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
  - 2. Flat and lap joints shall be made in direction of flow.
  - 3. Soldering:

- a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.
  - b. Wire brush to produce a bright surface before soldering lead coated copper.
  - c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
  - d. Completely remove acid and flux after soldering is completed.
- C. Edges:
- 1. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Provide drip at the bottom of all vertical sheet metal and at other locations as indicated and as requires to prevent water infiltration.
  - 2. All metal roof edges shall meet requirements of building code.

## **2.4 FINISH**

- A. In accordance with NAAMM Metal Finishes Manual, unless otherwise specified.
- B. Finish exposed metal surfaces as follows, unless specified otherwise:
  - 1. Steel and Galvanized Steel: Fluorocarbon Finish: Performance equal to AAMA 2604, high performance organic coating.
  - 2. Aluminum: Fluorocarbon Finish: Performance equal to AAMA 2604, high performance organic coating.

## **2.5 MISCELLANEOUS FLASHING AND COUNTERFLASHING**

- A. Prefinished aluminum, 0.81 mm (0.032 inch) thick, unless noted otherwise.
- B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip.
  - 1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
  - 2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
  - 3. Two-piece, lock in type flashing may be used in lieu of one piece counter-flashing.
  - 4. Manufactured assemblies may be used.
  - 5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
  - 6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

## **2.6 FASCIAS**

- A. Fabricate of 1.01 mm (0.040 inches) thick prefinished aluminum.
- B. Fabricate coping to profile shown with extruded aluminum mounting bar.

1. Minimum thickness of mounting bar: 2.03 mm (0.080 inches)

## **2.7 COPINGS**

- A. Fabricate of 1.6 mm (0.063 in.) prefinished aluminum.
- B. Fabricate coping to profile shown.
- C. Use continuous edge strips with drips at bottom edges on.
- D. Form joints between sections with either alternate 4 or 5 as shown on Figure 3-2, SMACNA, unless shown otherwise.
- E. Fabricate corners with mitered joints, riveted and soldered.
- F. Fabricate ends of coping terminating at vertical building surfaces to form a slot for the installation of sealant.
- G. Fabricate exterior ends of coping closures of same appearance as exterior wall side.

## **2.8 FLASHING UNDER STONE COPING**

- A. Stainless Steel: 0.4 mm (0.015 inch).

## **2.9 HANGING GUTTERS**

- A. Fabricate gutters of Prefinished Aluminum of thickness recommended by SMACNA Architectural Sheet Metal Manual for the configuration and size indicated.
- B. Fabricate according SMACNA Architectural Sheet Metal Manual.
- C. Fabricate of prefinished aluminum, 0.81 mm (0.032 inch) thick, unless noted otherwise.
- D. Support as recommended by SMACNA Architectural Sheet Metal Manual.
- E. Outlet Tubes:
  1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch). Flange upper end of outlet tube 13 mm (1/2 inch).
  2. Seal aluminum tube to gutter and rivet to gutter.
  3. Fabricate basket strainers of same material as gutters.
- F. Provide all brackets and supports as shown on Drawing and as recommended by SMACNA Architectural Sheet Metal Manual
- G. Match existing.

## **2.10 CONDUCTORS (DOWNSPOUTS)**

- A. Fabricate of prefinished aluminum, 0.81 mm (0.032 inch) thick, unless noted otherwise.
- B. Fabricate conductors of same metal and thickness as gutters in sections approximately 3000 mm (10 feet) long with 19 mm (3/4 inch) wide flat locked seams.
  1. Fabricate open face channel shape with hemmed longitudinal edges.

- C. Fabricate elbows by mitering, riveting, and soldering except seal aluminum in lieu of solder. Lap upper section to the inside of the lower piece.
- D. Fabricate conductor brackets or hangers of same material as conductor, 2 mm (1/16 inch) thick by 25 mm (one inch) minimum width. Form as require for configuration shown.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. General:
  - 1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, Architectural Sheet Metal Manual, except as otherwise shown or specified.
  - 2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS .
  - 3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
  - 4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
  - 5. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
  - 6. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Architectural Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
  - 7. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
  - 8. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
  - 9. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
  - 10. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.

11. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.

### **3.2 MISCELLANEOUS FLASHING AND COUNTERFLASHING**

#### **A. General:**

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

#### **B. One Piece Counterflashing:**

1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
3. Where flashing is surface mounted on flat surfaces.
  - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center.
    - 1) Locate fasteners in masonry mortar joints.
    - 2) Use screws to sheet metal or wood.
  - b. Fill joint at top with sealant.
4. Where flashing or hood is mounted on pipe.
  - a. Secure with draw band tight against pipe.
  - b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
  - c. Completely fill joint at top with sealant.

### 3.3 COPINGS

#### A. General:

1. On walls topped with a wood plank, install a continuous edge strip on the front and rear edge of the plank. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.
2. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
3. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS .

#### B. Aluminum Coping:

1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
2. Install joint covers, centered at each joint, and securely lock in place.

### 3.4 HANGING GUTTERS

#### A. Hang gutters dead level.

#### B. Lap joints, except for expansion joints, at least 25 mm (one inch) in the direction of flow. Rivet and seal lapped joints.

#### C. Support gutters as shown and as recommended by SMACNA Architectural Sheet Metal Manual.

#### D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.

#### E. Gutter Expansion Joint:

1. Locate expansion joints midway between outlet tubes.
2. Provide at least a 25 mm (one inch) expansion joint space between end baffles of gutters.
3. Install a cover plate over the space at expansion joint.
4. Fasten cover plates to gutter section on one side of expansion joint only.
5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.

#### F. Outlet Tubes: Set bracket strainers loosely into gutter outlet tubes.

### 3.5 CONDUCTORS (DOWNSPOUTS)

#### A. Sleeve conductors to gutter outlet tubes and fasten and seal joint.

#### B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout,

intermediate straps and strap at bottom shall be slotted to allow not less than 13 mm (1/2 inch) movement for each 3000 mm (10 feet) of downspout.

- C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

- - - END - - -



## **SECTION 07 71 00 ROOF SPECIALTIES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. Section specifies equipment supports and curbs.

#### **1.2 RELATED WORK**

- A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.
- B. Rigid insulation and coordination with roofing installation: Section 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING.
- C. Counterflashing: Section 07 60 00, FLASHING AND SHEET METAL.
- D. Curbs and support provide with Mechanical Equipment: DIVISION 23.

#### **1.3 QUALITY CONTROL**

- A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.
- B. Each accessory type shall be the same and be made by the same manufacturer.
- C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Representative sample panel of color anodized aluminum not less than 100 mm X 100 mm (four by four inches), except extrusions shall be a width not less than section to be used. Sample shall show coating with integral color and texture and shall include manufacturer's identifying label.
- C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.
- D. Manufacturer's Literature and Data: Each item specified.

#### **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 Material (ASTM):
  - A653/A653M-02.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process
  - C612-00 .....Mineral Fiber Block and Board Thermal Insulation

D1187-97 .....Asphalt-Base Emulsions for Use as Protective Coatings for  
Metal

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Galvanized Sheet Steel: ASTM A526/A526M; G-90 coating.

### **2.2 EQUIPMENT SUPPORTS**

- A. Fabricate equipment supports from 1.3 mm (0.0516 inch) thick galvanized steel.
- B. Form exterior curb with integral base and deck closures for curbs installed on steel decking.
- C. Use galvanized steel liners for curbs having inside dimension over 305 mm (12 inches).
- D. 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.
- E. Make size of supports suit size of equipment furnished, with height as indicated, but not less than 200 mm (8 inches) above roof surface.
- F. Provide curbs with integral fiberglass insulation.

## **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 size and configuration of all equipment supports and curbs with equipment to be supported; see DIVISION 23.
- D. Coordinate to install insulation and flashing ; see Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.
- E. Coordinate for counter flashing; see Section 07 60 00, FLASHING AND SHEET METAL.
- F. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.
- G. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
- H. After completion of base flashing bend down cap flashing flange and secure to blocking with screws.
- I. Equipment Supports: Do not anchor to insulating concrete or metal deck. Anchor only to building structure as per manufacturers recommendations.

### **3.2 PROTECTION FROM GALVANIC ACTION**

- A. Provide protection 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.

### **3.3 PROTECTION**

- A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

- - - E N D - - -



**SECTION 07 71 29**  
**ROOF MOVEMENT JOINTS COVERS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies roof movement joints including expansion and seismic.

**1.2 RELATED WORK**

- A. Sealant material and installation: Section 07 92 00, JOINT SEALANTS.
- B. Installation of related roofing elements: Section 07 54 23, THERMOPLASTIC POLYOLEFIN (TPO) ROOFING and Section 07 60 00, FLASHING AND SHEET METAL.

**1.3 QUALITY CONTROL**

- A. All roof accessories shall be the products of manufacturers regularly engaged in producing the kinds of products specified.
- B. Each accessory type shall be the same and be made by the same manufacturer.
- C. Each accessory shall be completely assembled to the greatest extent possible before delivery to the site.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Furnish manufacturer's standard-size samples of proposed joint cover. Sample shall include manufacturer's identifying label.
- C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings. Include intersections, transitions, and fittings and attachments to other units of Work. Show relationship and anchorage to adjacent materials.
- D. Manufacturer's Literature and Data: Each item specified.

**1.5 WARRANTY**

- A. Special Warranty: Submit a written warranty signed by the roof movement control joint cover manufacturer and installer agreeing to repair or replace roof movement control joint cover, including factory-fabricated intersections and terminations, and factory-furnished field splice materials that leak or deteriorate due to weathering so that they become incapable of performing their role in maintaining a watertight joint.
- B. Warranty Period: 10 years after date of Substantial Completion.

## 1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
  - RR-G-1602D.....Grating, Metal, Other Than Bar Type (Floor, Except for Naval Vessels)
- C. American Society for Testing and Material (ASTM):
  - A653/A653M-02.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) By the Hot-Dip Process
  - B209/209M-02.....Aluminum and Aluminum Alloy-Sheet and Plate
  - B221/221M-02.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
  - C612-00 .....Mineral Fiber Block and Board Thermal Insulation
  - D1187-97 .....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):
  - 605-98 .....High Performance Organic Coatings on Architectural Extrusions and Panels.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Stainless Steel: AISI Type 304, complying with ASTM A 167, 2D annealed finish, soft, except where harder temper is required for forming or performance; minimum 0.46 mm. (0.018 in) thick
- B. Aluminum, Extruded: ASTM B221/B221M.
- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M) alloy 3003-H14, mill finish; minimum 0.81 mm. (0.032 in) thick except as otherwise.
- D. Galvanized Sheet Steel: ASTM A653/653M; G-90 coating, minimum 0.56 mm (26 gauge).
- E. Bellow Supports: Closed cell foam, of thickness recommended by joint manufacturer.
- F. Cover Membrane: TPO membrane as recommended by membrane roofing manufacturer.

## 2.2 ACCESSORIES

- A. Miscellaneous metal, plastic membrane flashing, and counterflashing as required to provide a watertight flexible joint when where primary movement joint cover meets adjacent walls, other adjacent surfaces or where primary joint otherwise terminates.
- B. Termination Bar: 1 in. (2.5 cm) wide pre-punched extruded aluminum bar.
- C. Fasteners: Corrosion-resistant fasteners compatible with flange metal and equivalent in corrosion resistance, of proper length and type for substrate.
- D. Where roof is fire-rated, provide integral, UL-tested fire barrier below joint.

## 2.3 ROOF MOVEMENT JOINT COVER

- A. Provide manufacturer's standard assemblies of sizes and types indicated, including prefabricated corner, transition, termination and joint-intersection units, splicing units, adhesives, coatings and other components as recommended by joint cover manufacturer for a complete installation. Fabricate assemblies specifically for required applications.
- B. Membrane-covered, Bellow-type Roof Movement Control Joint Cover with Concealed Attachment Flanges: Provide assemblies consisting of exposed elastomeric sheet adhesively attached to foam bellow supports and attachment flange fabric.
  - 1. Membrane Cover: White TPO
- C. Formed Metal Copping Type: Provide a manufactures or shop fabricated coping design to be anchored separately to the two sides with semi-resilient type clips permitting moderate movement while retaining wind and water resistance.
  - 1. Material: Prefinished galvanized metal. Conform generally to Section 07 60 00.
  - 2. Provide a flexible TPO membrane flashing below metal coping as a secondary barrier.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing and other items affecting work of this Section are in place and positioned correctly.
- B. Substrate Conditions: Do not begin installation until substrates have been inspected and are determined to be in satisfactory condition, with blocking fully anchored at proper location and elevation. All surfaces shall be smooth, dry, clean and free of fins or sharp edges, loose or foreign materials, oil or grease. No work shall proceed when moisture is present on the roof or in the materials that require adhesive attachment.

### 3.2 INSTALLATION

- A. Comply with manufacturer's instructions for handling and installing roof joint covers and materials, except where more stringent requirements are indicated.
- B. Coordinate installation of roof joint covers and associated work so that complete assemblies comply with assembly performance requirements.
- C. Extend roof joint covers over curbs, parapets, fascia and other elements in the construction profile, with factory-fabricated corners, transitions, intersections and terminations to provide continuous, uninterrupted, waterproof assemblies.
- D. Provide uniform profile throughout length of each installation; do not stretch elastomeric sheets.
- E. Coordinate installation of joint covers with adjacent construction for weathertight assembly. Secure with fasteners.
- F. Secure concealed flanges of bellows to curb and to wall with anchors recommended by manufacturer in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise
- G. Flash flanges into roof system per roof system manufacturer's requirements.
- H. Splice adjoining sections, corners, transitions, intersections, terminations and expansion slots as recommended by manufacturer. Clean splice area to assure proper adhesion of splice strip. Ensure adjacent sections are properly aligned and uniform in profile.
- I. Adhere membrane cover to substrate with compatible adhesive or mastic. Set termination bar in mastic for water cut-off, secure with termination bar fasteners.
- J. Comply with section 07 92 00, JOINT SEALANTS to install sealants where manufactures installation instructions require sealant.

### 3.3 PROTECTION

- A. Protect roof accessories from damage during installation and after completion of the work from subsequent construction.

--- E N D ---

**SECTION 07 81 00  
APPLIED FIREPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. 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. Submit a specific listing from a recognized fire testing laboratory (UL Design or similar) showing complete construction and listing all required materials.
    - a. List thickness and density of material required to meet fire ratings.
  - 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 ASSURANCE**

- A. Applicator: Company specializing in performing work of the type specified in this section, and:
  - 1. Having a minimum of 5 years experience.
  - 2. Acceptable to the spray-on fireproofing manufacturer.

## 1.5 QUALITY CONTROL

- A. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.
- B. Manufacturer's inspection and approval of surfaces to receive fireproofing as specified under paragraph Examination.
- C. Manufacturer's approval of fireproofing applications.
- D. Manufacturer's approval of completed installation.
- E. Manufacturer's representative shall observe and advise at the commencement of application, and shall visit the site as required thereafter for the purpose of ascertaining proper application.
- F. Pre-Application Test Area.
  - 1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
    - a. Apply for the hourly ratings used.
  - 2. Install in location selected by the Resident Engineer, for approval by the representative of the fireproofing material manufacturer and by the Government.
  - 3. Perform Bond test on painted steel in accordance with ASTM E736.
  - 4. Do not proceed in other areas until installation of test area has been completed and approved.
  - 5. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.
  - 6. Approved test area may remain as a part of the final

## 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):
  - C841-03 .....Installation of Interior Lathing and Furring
  - C847-06 .....Metal Lath
  - E84-08.....Surface Burning Characteristics of Building Materials
  - E119-08.....Fire Tests of Building Construction and Materials
  - E605-93 (R2006) .....Thickness and Density of Sprayed Fire-Resistive Materials  
Applied to Structural Members
  - E736-00.....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

G21-96 (R2002) .....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):

Certification Listings ....Latest Edition

E. Factory Mutual System (FM):

Approval Guide .....Latest Edition including Supplements

## **PART 2 - PRODUCTS**

### **2.1 SPRAYED-ON FIREPROOFING**

A. Materials containing asbestos are not permitted.

B. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

	Characteristic	Test	Results
1.	Density	ASTM E605	352 g/l (22 lb/ft <sup>3</sup> ) minimum
2.	Deflection	ASTM E759	No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3m (10 ft.)
3.	Corrosion-Resistance	ASTM E937	No promotion of corrosion of steel.
4.	Bond Impact	ASTM E760	No cracking, spalling, or delamination.
5.	Cohesion/Adhesion (Bond Strength)	ASTM E736	Minimum cohesive/adhesive strength of 20.8 kPa (434 lbf/ft <sup>2</sup> )
6.	Air Erosion	ASTM E859	Maximum gain weight of the collecting filter 0.27gm/m <sup>2</sup> (0.025 gm/ft <sup>2</sup> ).
7.	Compressive Strength	ASTM E761	Minimum compressive strength 352 kPa (51 lbf/in <sup>2</sup> ).

8.	Surface Burning Characteristics with adhesive and sealer to be used	ASTM E84	Flame spread 0 and smoke developed 0.
9.	Fungi Resistance	ASTM G21	Resistance to mold growth when inoculated with aspergillus niger (28 days for general application)

## 2.2 BONDING AIDES

- A. Provide primers and adhesives as recommended by the spray-on fireproofing manufacturer.
- B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

## 2.3 SEALER

- A. If recommended by the manufacturer, provide as recommended.

## 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<sup>2</sup> (1.7 pounds per square yard).
- B. Fasteners: ASTM C841.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.
- B. Verify hangers, inserts and clips are installed before the application of fireproofing material.
- C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.
- D. Verify concrete work on steel decking and concrete encased steel is completed.
- E. Verify temperature and enclosure conditions are required by fire-proofing material manufacturer.

## 3.2 APPLICATION

- A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.
- B. Coordinate application of fireproofing material with other trades.

C. Application of Metal Lath:

1. Apply to beam, joists, and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
2. Apply to beam flanges 300 mm (12-inches) or more in width.
3. Apply to column flanges 400 mm (16-inches) or more in width.
4. Apply to beam or column web 400 mm (16-inches) or more in depth.
5. Apply so as to fully enclose all open web joists.
6. Tack weld or mechanically fasten on maximum of 300 mm (12-inch) center.
7. See design criteria section of the approved assemblies used.
8. 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.

E. Application shall be completed in one area, inspected and approved by Resident Engineer before removal of application equipment and proceeding with further work.

### 3.3 FIELD TESTS

- A. Tests of applied material will be performed by VA retained Testing Laboratory. See Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Test for thickness and density in accordance with ASTM E605. Resident Engineer will select area to be tested in specific bays on each floor using a geometric grid pattern. Areas showing thickness less than that required as a result of fire endurance test will be rejected.
- C. Test cohesion/adhesion as described ASTM E736 in two locations selected by the Resident Engineer. Areas showing less than required fireproofing characteristics will be rejected on the following field tests. Test shall be to simulate the minimum cohesion/adhesion indicated in this specification, but need not be to failure. For each failed test, test four more times at a distance of 4 feet in from the failed test in the four ordinal directions. Replace all sprayed applied fireproofing within three feet of a failed test location.
- D. Test bond impact strength as described in ASTM E760, except on a steel deck application. Test at two locations selected by the Resident Engineer. Areas showing less than required fireproofing

characteristics will be rejected on the following field tests. For each failed test, test four more times at a distance of 4 feet in from the failed test in the four ordinal directions. Replace all sprayed applied fireproofing within three feet of a failed test location.

### **3.4 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. Mark all repairs according to the manufacturer and testing agency's recommendation.
  - 2. Hand mixing of materials is not permitted unless specifically indicated as acceptable by the manufacturer.
  - 3. Spray the area to be patched unless the manufacturer and testing agency specifically allow hand applications.
- C. Repair:
  - 1. Respray all test and rejected areas.
  - 2. Patch fireproofing material which is removed or disturbed after approval.
- D. Perform final inspection of sprayed areas after patching and repair.

### **3.5 SCHEDULE**

- A. Apply fireproofing material in interior structural steel members and on underside of interior steel floor and roof decks in area indicated on drawings (over the office and waiting area).
  - 1. Resulting roof construction shall provide a 1 hour fire barrier rating.
  - 2. Design Basis: UL Design P719

--- E N D ---

## **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. Sealants and application: Section 07 92 00, JOINT SEALANTS.
- B. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS, Section 23 37 00, AIR OUTLETS AND INLETS.

#### **1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping materials used. Products submitted must correspond to the tested designs submitted
- C. Submit a copy of each FM, UL or WH tested design to be used in the project showing all materials and instantiation requirements.
- D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.
- E. Schedule: If multiple systems are submitted, provide a schedule clearly indicating where each system is to be used.

#### **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**

- A. Firestopping work for a period of five years.

## 1.6 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs which provide the specified fire ratings when tested in accordance with methods indicated.
  - 1. Listing in the current-year classification or certification books of UL, FM, Omega Point or WH will be considered as constituting an acceptable test report.
  - 2. If no test design is available to meet the requirements of the project, provide Engineerd Judgment or such substantiation as may be required by the Authority Having Jurisdiction.
- B. Installer Qualifications: Company specializing in performing the work of this section and Approved by Factory Mutual Research under FM Standard 4991, "Approval of Firestop Contractors" or meeting at least two of the following requirements:
  - 1. With minimum 3 years documented experience installing work of this type.
  - 2. Able to show at least 5 satisfactorily completed projects of comparable size and type.
  - 3. Approved by firestopping manufacturer.

## 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):
  - E84-07.....Surface Burning Characteristics of Building Materials
  - E814-06.....Fire Tests of Through-Penetration Fire Stops
- C. Factory Mutual Engineering and Research Corporation (FM):
  - Annual Issue Approval Guide Building Materials
  - Standard 4991 .....Approval of Firestop Contractors
- D. Underwriters Laboratories, Inc. (UL):
  - Annual Issue Building Materials Directory
  - Annual Issue Fire Resistance Directory
  - 1479-03 .....Fire Tests of Through-Penetration Firestops
- E. Warnock Hersey (AKA Intertek Testing Services) (WH or ITS):

## Annual Issue Certification Listings

**PART 2 - PRODUCTS****2.1 FIRESTOP SYSTEMS**

- A. Use either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 m<sup>2</sup> (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 including resistant to mold.
  - 4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
- E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:
  - 1. Classified for use with the particular type of penetrating material used.
  - 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
  - 3. Intumescent products which would expand to seal the opening and act as barrier to 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.
- I. Where the firestopping will be exposed to traffic or to frequent contact with the public, the material must be durable and undamaged by the normal wear it will be expected to receive.
- J. Where the firestopping may reasonably be expected to experience differential movement, the material must be elastomeric in nature and have a tested elongation equal to or greater than the change in dimension that can be reasonably anticipated.
- K. All materials used in firestopping systems, including packing and anchoring materials, must conform to the requirements of the tested design (FM, UL or WH design) and must conform to all requirements of the primary firestopping material manufacturer.

## **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.

## **2.3 ACCESSORIES**

- A. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design and as recommended by the manufacturer of the primary firestopping material.
- B. Labels: Red and white self-adhesive label, or plastic or metal plate. As a minimum stating the installation is a “fire rated assembly” or “through-penetration fire stop system,” and installation data (UL-Listed or FM-Approved configuration number) date installed, installer and organization. Also state “Modify/remove only with {-installing contractors name-} approval” if space permits.

# **PART 3 - EXECUTION**

## **3.1 PREPARATION**

- A. Prepare surface according to the recommendations of the manufacturer including providing primer where recommended.

- B. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- C. Remove insulation on insulated pipe for a distance of 150 mm (six inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

### **3.2 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.

### **3.3 LABELING**

- A. All firestopping installations are to be labeled as described herein.
- B. Labels shall be frequent and visible enough that future activities requiring penetration of the fire barrier will recognize the need for firestopping.
- C. Label on both sides of the penetrated fire/smoke barrier.
- D. Provide labels as described under PART 2- MATERIALS.

### **3.4 CLEAN-UP AND ACCEPTANCE OF WORK**

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.
- C. Clean up spills of liquid type materials.

--- E N D ---



**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. 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. Control joints: Section 09 29 00, GYPSUM BOARD
- B. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

**1.3 QUALITY CONTROL:**

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
  - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
  - 3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
  - 4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:

1. Locate test joints where indicated or, if not indicated, as directed by Contracting Officer.
2. Conduct field tests for each application indicated below:
  - a. Each type of elastomeric sealant and joint substrate indicated.
  - b. Each type of non-elastomeric sealant and joint substrate indicated.
3. Notify Resident Engineer seven days in advance of dates and times when test joints will be erected.

#### **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.
- E. Schedule: If multiple sealants and caulks are submitted for the Project, provide a schedule clearly indicating the use for which each sealant is being submitted.

#### **1.5 PROJECT CONDITIONS:**

- A. Environmental Limitations:
  1. Do not proceed with installation of joint sealants under following conditions:
    - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °F).
    - b. When joint substrates are wet.
    - c. When moisture level in the substrate exceeds that recommended by the sealant manufacturer.
- B. Joint-Width Conditions:
  1. Do not proceed with installation of joint sealants where joint widths are less than or greater than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:

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

#### **1.6 DELIVERY, HANDLING, AND STORAGE:**

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

#### **1.7 DEFINITIONS:**

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod or Backer 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. Warrant interior sealing against cracking, crazing, adhesion, and cohesive failure, for a period of two 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 Society for Testing and Materials (ASTM):
  - C612-04 .....Mineral Fiber Block and Board Thermal Insulation.
  - C717-07 .....Standard Terminology of Building Seals and Sealants.
  - C834-05 .....Latex Sealants.
  - C919-02. ....Use of Sealants in Acoustical Applications.
  - C920-05 .....Elastomeric Joint Sealants.
  - C1021-01 .....Laboratories Engaged in Testing of Building Sealants
  - C1193-05 .....Standard Guide for Use of Joint Sealants.
  - C1330-02 .....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
  - E84-07.....Surface Burning Characteristics of Building Materials.
- C. Sealant, Waterproofing and Restoration Institute (SWRI).
  - The Professionals' Guide

## PART 2 - PRODUCTS

### 2.1 ELASTOMERIC SEALANTS:

- A. S-1:
  - 1. ASTM C920 polyurethane or polysulfide.
  - 2. Type S.
  - 3. Class 25.
  - 4. Grade NS.
  - 5. Shore A hardness of 25-40.
- B. S-2:
  - 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.
- C. S-3
  - 1. ASTM C920 silyl-terminated polyether (STP)
  - 2. Type S.
  - 3. Class 50.
  - 4. Grade NS.
  - 5. Shore A hardness of 17-30.
- D. S-4:
  - 1. 1. ASTM C920, polyurethane or polysulfide.
  - 2. 2. Type M.
  - 3. 3. Class 25.
  - 4. 4. Grade P.
  - 5. 5. Shore A hardness of 25-40.
- E. S-5
  - 1. Provide chemically resistant sealant conforming to ASTM C920. Sealant may be polyurethane, polysulfide, epoxy, STP, or a combination or polymer version of any of these, but it must be certified for use such location a petroleum and waste water treatment tanks.
  - 2. Type M or S.

3. Class 25.
4. Grade NS.
5. Shore A hardness of 25 or greater.

## **2.2 SOLVENT RELEASE SEALANTS**

- A. R-1
  1. Butyl or polyisobutylene, nondrying, nonskinning.
  2. Conform to ASTM C 1311.

## **2.3 CAULKING COMPOUND:**

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, nondrying, non-hardening, synthetic rubber.
- C. C-3: One component caulk design and recommended by the manufacture for acoustical applications, but provide a durable “skin” that can be exposed to general touch and contact.

## **2.4 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. Sealants around door frames shall match color of door frames.
- D. Sealants for countertops and backsplashes shall match the base color of the counter top of backsplash.
- E. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.
- F. Caulking shall be light gray or white, unless specified otherwise.

## **2.5 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 B, non-gasing, bicellular polyolefin with non-absorbing outer skin
- C. 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. Bond-breaker tape may be used only where it is impossible to use a Backing Rod and only with the approval of the Resident Engineer.

## **2.6 FILLER:**

- A. As recommended by the sealant manufacturer and containing no bitumen.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

## **2.7 PRIMER:**

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

## **2.8 CLEANERS-NON POROUS SURFACES:**

- A. 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. Nonporous surfaces include the following:
  - a. Metal.
  - b. Glass.
  - c. Porcelain enamel.
  - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
- 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 to a uniform depth as required to meet requirements for sealant depth as recommended by the sealant manufacturer.
- 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. Do not use bond breaker tape unless first approved by the Resident Engineer.
- F. Do not leave gaps between ends of sealant backings.
- G. Do not stretch, twist, puncture, or tear sealant backings.
- H. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

### 3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch)  
maximum depth at center of joint with sealant thickness at center of joint approximately 1/2  
of depth at adhesion surface.

### 3.5 INSTALLATION:

- A. General:
  - 1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 and 100 degrees F).
  - 2. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
  - 3. Apply caulking and sealing compound in accordance with manufacturer's printed instructions and ASTM C1193.
  - 4. Avoid dropping or smearing compound on adjacent surfaces.
  - 5. Fill joints solidly with compound and finish compound smooth.
  - 6. Tool joints to concave surface unless shown or specified otherwise.
  - 7. Finish paving or floor joints flush unless joint is otherwise detailed.
  - 8. Apply compounds with nozzle size to fit joint width.
  - 9. Test sealants for compatibility with each other and substrate. Use only compatible sealant.
- B. Where gypsum board partitions are of fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
  - 1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
  - 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
  - 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
  - 4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. 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 smoke through control joint.

### **3.6 FIELD QUALITY CONTROL:**

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as recommended by sealant manufacturer:
  1. Execute one pull test for each type of sealant applied to each substrate where it will be used.
  2. Repeat test for any applications that fail the initial test.
  3. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
  4. Repair or replace sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- B. Inspections: Inspect all installed sealants and provide a written report including:
  1. Whether sealants filled joint cavities and are free from voids.
  2. Whether sealant dimensions and configurations comply with specified requirements.
  3. Conditions which may pose problems for the durability or future performance of the installation.

### **3.7 CLEANING:**

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with water, cleanser or solvent as recommended by the caulking or sealant manufacturer. Do not damage surface being cleaned.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

### **3.8 LOCATIONS:**

- A. Vertical and Horizontal Joints in Building Exterior: Type S-1 or S-3, unless noted otherwise.
- B. Exterior Pavement and Other Non-Building Horizontal Joints: Type S-1 or S-4.
- C. Bedding Joints:
  1. Thresholds: Type R-1
  2. Sheet Metal Flashing/Coping: Type R-1

- D. Acoustical Joints:
  - 1. Fully concealed: C-2.
  - 2. Exposed and Semi-Exposed: C-3
- E. Sanitary Joints:
  - 1. Walls to Plumbing Fixtures: Type S-2
  - 2. Counter Tops to Walls: Type S-2
  - 3. Pipe Penetrations: Type S-2 (Except where required to be firestopped).
- F. Joints inside Decontamination Showers: Type S-5
- G. Interior Caulking:
  - 1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components:  
Type C-1.
  - 2. Perimeter of Doors, Windows, Access Panels and Adjacent surfaces: Type C-1.
  - 3. Exposed Isolation Joints at Top of Full Height Walls: Type S-1 or S-3
  - 4. Smoke stopping in smoke partitions: S-1 or S-3.

--- E N D ---

**SECTION 07 95 13**  
**EXPANSION JOINT COVER ASSEMBLIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies floor and wall building expansion joint assemblies.
- B. Types of assemblies:
  - 1. Metal Plate Cover

**1.2 RELATED WORK**

- A. Roof Expansion Joints: Section 07 71 29, ROOF MOVEMENT JOINT COVERS.
- B. Sealants: 07 92 00, JOINT SEALANTS

**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.
- 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.

## 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-05.....	Structural Steel
A167-99 (R2004).....	Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A283/A283M-03.....	Low and Intermediate Tensile Strength Carbon Steel Plates
A786/A786M-05.....	Rolled Steel Floor Plates
B36/B36M-06 .....	Brass, Plate, Sheet, Strip, and Rolled Bar
B121-01(R2006) .....	Leaded Brass Plate, Sheet, Strip and Rolled Bar
B209M-06 .....	Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
B221M-06 .....	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
B455-05 .....	Copper-Zinc Lead Alloy (Leaded Brass) Extruded Shapes
C864-05 .....	Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
C920-05 .....	Elastomeric Joint Sealants
D1187-97 (R2002).....	Asphalt Base Emulsions for Use as Protective Coatings for Metal
D2287-96 (R2001).....	Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
E119-07 .....	Fire Tests of Building Construction and Materials
E814-06 .....	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 .....Tests of Fire Endurance of Building Construction and Materials

F. Underwriters Laboratories Inc. (UL):

263 .....Fire Tests of Building Construction and Materials

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

A. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5 or T6.

B. Elastomeric Sealant: See Section 07 92 00, JOINT SEALANTS.

C. Fire Barrier:

1. Where require, provide UL-tested, concealed, integral fire barrier.

D. 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.

### **2.2 FABRICATION**

A. General:

1. Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated and as required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
2. 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.
3. Furnish units in longest practicable lengths to minimize number of end joints. Provide mitered corners where joint changes directions or abuts other materials.
4. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections and other assemblies.
5. Fire-Barriers:

- a. For joint widths up to and including 150 mm (six inches), supply barrier in lengths up to 15000 mm (50 feet) to eliminate field splicing.
- 6. Seal Strip factory - formed and bonded to metal frames and anchor members.
- 7. Compression Seals: Prefabricate from thermoplastic rubber or dense neoprene to sizes and approximate profiles shown.
- 8. Where floor plates are exposed in openings (such as doorways) and within the main walking path, provide surfaces that will not become slippery when wet.
- B. Floor-to-Floor Metal Plate Joints:
  - 1. Flat stainless steel plate designed to be anchored to one side of joint and move freely at other side of joint. Manufactured design to conform closely to details shown on Drawings.
  - 2. Design cover plates to support 600 Kg/square meter (400 lbs/square foot).
  - 3. Cover plates free of rattle due to traffic.
  - 4. Maximum Plate Thickness: 6 mm (0.25 inches)
  - 5. Edges of plate to be beveled so as not to produce an abrupt edge.
  - 6. Plate surface shall be textured to provide a "slip-proof" surface, even when wet.
- C. Interior Wall Joint Cover Assemblies:
  - 1. Sealant and filler as shown on Drawings.
- D. Exterior Wall Joint Assemblies (Between existing and new buildings):
  - 1. Pre-compressed, silicone coated, open micro-cell polyurethane foam, impregnated with hydrophobic, polymer sealing compound.
    - a. Exposed face to be coated with colorized, semi-rigid, elastomeric fluted surface.
    - b. Shall be possible to cut width of product to fit between profiled wall surfaces and still provide a watertight, elastomeric seal.
    - c. Provide a double seal consisting of two separate foam rods as described except that interior most of the two rods need not have the factory applied silicone facer.
    - d. Provide a product similar to BASF, Watson Bowman Acme, WABO SeismicWeatherSeal.

## **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: Mill Finish

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Manufacturer's representative shall make a thorough examination of surfaces receiving work of this section.
- B. Before starting installation, notify prime contractor of defects which would affect satisfactory completion of work.

**3.2 PREPARATION**

- A. Verify measurements and dimensions at job site and cooperate in coordination and scheduling of work with work of related trades.
- B. Give particular attention to installation of items embedded in concrete and masonry so as not to delay job progress.
- C. Provide templates to related trade for location of support and anchorage items.

**3.3 INSTALLATION**

- A. Install in accordance with manufacturers installation instructions unless specified otherwise.
- B. Provide anchorage devices and fasteners for securing expansion joint assemblies to in-place construction including threaded fasteners with drilled-in fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide metal fasteners of type and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.
- C. Perform cutting, drilling and fitting required for installation of expansion joint cover assemblies.
- D. Install joint cover assemblies in true alignment and proper relationship to expansion joint opening and adjoining finished surfaces measured from established lines and levels.
- E. Allow for thermal expansion and contraction of metal to avoid buckling.
- F. Set floor covers at elevations flush with adjacent finished floor materials unless shown otherwise.
- G. Material and method of grouting floor frames set in prepared recesses in accordance with manufacturer's instructions.
- H. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories.
- I. Locate anchors at interval recommended by manufacturer, but not less than 75 mm (3-inches) from each ends, and, not more than 600 mm (24-inches) on centers.
- J. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.

- K. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames or plates.
- L. Surface Mounted Metal Cover Plates:
  - 1. Install as indicated by manufacturer and as shown on drawings.
  - 2. Set both “fixed” and “free” side in butyl bedding sealant.
- M. 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.
- N. Sealants: Install to prevent water and air infiltration.
- O. Vertical Wall Joints:
  - 1. Conform to details as shown on Drawings.
  - 2. See Section 07 92 00, JOINT SEALANTS.

### **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.

- - - END - - -

**SECTION 08 11 13**  
**HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies steel doors, steel frames for doors, and borrowed lites 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. Wood doors in hollow metal frames: Section 08 14 00, WOOD DOORS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Glass in door panels: Section 08 80 00, GLAZING.

**1.3 TESTING**

- A. 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.
- C. Unified Schedule: Submit a schedule containing doors, frames and hardware conforming to DHI "Sequences and Format for the Hardware Schedule" (A115 Series).
- D. Certifications: Certify that products meet the requirements of this Section.

**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. Door and Hardware Institute (DHI):
  - A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)
- C. Steel Door Institute (SDI):
  - 122 .....Installation and Troubleshooting Guide for Steel Doors and Frames
  - A250.8-98 .....Standard Steel Doors and Frames
  - A250.11 .....Recommended Installation Instructions for Steel Frames
- D. American Society for Testing and Materials (ASTM):
  - and Cold-Rolled
  - A 653/A 653M-06a.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - A1008-04 .....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability
  - D1621-00 .....Compressive Properties of Rigid Cellular Plastics
  - D3656-97 .....Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns
  - E90-02.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E. The National Association Architectural Metal Manufacturers (NAAMM):
  - Metal Finishes Manual (1988 Edition)
- F. National Fire Protection Association (NFPA):
  - 80 .....Fire Doors and Fire Windows
- G. Underwriters Laboratories, Inc. (UL):
  - Fire Resistance Directory
- H. Intertek Testing Services (ITS):
  - Certifications Listings...Latest Edition
- I. 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. Galvanizing (All Exterior and Basement Doors and Frames): All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M to minimum A60 or G60.
- C. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.
- D. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

### **2.2 FABRICATION GENERAL**

- A. Conform to SDI A250.8.
- B. Coordinate door and frame hardware preparation and reinforcement with Section 08 71 00, DOOR HARDWARE.
- C. Tolerances as per SDI A250.8

### **2.3 METAL DOORS**

- A. GENERAL:
  - 1. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
  - 2. Close top edge of all doors flush and seal to dust from entering and collecting.
  - 3. Provide beveled, seamless vertical edges.
- B. Heavy Duty Doors (All Interior 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 (All Exterior 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 detention doors, stairwell doors and security doors. See additional requirements for detention doors, under paragraph "Custom Hollow Metal Doors.
- D. Smoke and Fire Rated Doors:
  - 1. Conform to NFPA 80.

### **2.4 METAL FRAMES**

- A. General:
  - 1. Interior Doors: SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.

2. Interior Extra Wide Doors: Frames for doors over 1 m (3'-6") wide: Fabricate from 1.7 mm (0.067 inch) thick sheet steel.
  3. Frames for labeled fire rated doors
    - a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Intertek 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. Knocked-down frames are not acceptable.
- B. Reinforcement and Covers:
1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
  2. Provide mortar guards securely fastened to back of hardware reinforcements.
- C. Frame Anchors:
1. Floor anchors:
    - a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
    - b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts.
  2. Jamb anchors:
    - a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for fire rated frames space anchors as required by labeling authority.
    - b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.
    - c. Anchors 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.
    - d. Anchors for frames set in prepared openings:
      - 1) Steel pipe spacers with 6 mm (1/4 inch) inside diameter welded to plate reinforcing at jamb stops or hat shaped formed strap spacers, 50 mm (2 inches) wide, welded to jamb near stop.
      - 2) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass thru frame and spacers.

- e. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

## **2.5 SHOP PAINTING**

- A. SDI A250.8.
- B. Verify that proposed primer is compatible finish paint as indicated in Section 09 91 00, PAINTING.
- C. Coating for Inside of Grouted Frame: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF FRAMES**

- A. Plumb, align and brace frames securely until permanent anchors are set.
  - 1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
  - 2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
  - 3. Protect frame from accidental abuse.
  - 4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
  - 5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.
- B. Floor Anchors:
  - 1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
  - 2. Power actuated drive pins may be used to secure frame anchors to concrete floors.
- C. Jamb Anchors:
  - 1. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
  - 2. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers.
- D. Install anchors for labeled fire rated doors to provide rating as required.
- E. Grout all frames in masonry or concrete walls with cementitious grout.

- F. Grout all frames in non-masonry walls with setting type gypsum joint compound or plaster.

### **3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE**

- A. Install doors and frames in accordance with the requirements of the door and frame manufacturer and in accordance with ANSI 250.11, SDI 122 and DHI A115.IG.
- B. In addition, install fire rated units in accordance with NFPA 80.

### **3.3 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

### **3.4 CORRECTION AND TOUCH UP**

- A. Any damage to doors and frames may be corrected only if correction is approved by the Resident Engineer. Otherwise replace damaged door or frame
- B. Touch up damaged galvanization with zinc-rich primer.
- C. Touch up primer wherever primer is damage or missing after installation.

--- E N D ---

**SECTION 08 14 00**  
**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 and smoke doors.

**1.2 RELATED WORK**

- A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.
- C. Glazing: Section 08 80 00, GLAZING.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.
- C. Shop Drawings:
  - 1. Show every door in project and schedule location in building.
  - 2. Indicate type, grade, finish and size; include detail of glazing 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. Indicate door core materials and construction; veneer species, type and characteristics.
  - 2. Labeled fire rated doors showing conformance with NFPA 80.
- E. Unified Schedule: Submit a schedule containing doors, frames and hardware conforming to DHI "Sequences and Format for the Hardware Schedule" (A115 Series).

**1.4 WARRANTY**

- A. Provide manufacturer's warranty on wood doors for the 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 AWS, Section 2.

- 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. ASTM International (ASTM):
  - E90-00.....Fire Tests of Door Assemblies
- C. Architectural Woodwork Institute (AWI)
  - AWS-09 .....Architectural Woodwork Standards.
- D. Door and Hardware Institute (DHI):
  - A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)
- E. International Conference of Building Officials Uniform Building Code (UBC)
  - UBC Std 7-2, Part II.....Test Standard for Smoke- and Draft-control Assemblies;
- F. National Fire Protection Association (NFPA):
  - 80 .....Fire Doors and Windows
  - 252 .....Fire Tests of Door Assemblies
- G. Window and Door Manufacturers Association (WDMA):
  - I.S.1-A-04 .....Architectural Wood Flush Doors
  - I.S.4-00.....Water-Repellent Preservative Non-Pressure Treatment for Millwork
  - TM-6-88.....Adhesive Bond Durability Test Method
  - TM-7-90.....Cycle-Slam Test Method
  - TM-8-90.....Hinge Loading Resistance Test Method
  - TM-10-90.....Screw Holding Test Method

## **PART 2 - PRODUCTS**

### **2.1 FLUSH DOORS AND PANELS**

- A. All Doors: See drawings for locations and additional requirements.
  - 1. Quality Level: Custom Grade, with A Grade veneer, in accordance with AWS, Section 10. WDMA Premium or Custom grade also acceptable.
  - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
  - 3. Edges: Beveled.

## **2.2 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type PC (Wood Particle Board) or SLC (Stave), plies and faces as indicated above.
- B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated.

## **2.3 DOOR FACINGS**

- A. Match existing doors in the building.
- B. Wood Veneer Facing for Transparent Finish: Red oak, veneer grade as specified above, plain sliced, book veneer match, balance assembly match; unless otherwise indicated.
  - 1. Vertical Edges: Any option allowed by quality standard for grade.
  - 2. Pairs: Pair match each pair; set match pairs within 10 feet (3 m) of each other when doors are closed.

## **2.4 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. Provide solid blocking as required to receive specified hardware.
- C. Fit door edge trim to edge of stiles after applying veneer facing.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
  - 1. Exception: Doors to be field finished.
- F. Provide edge clearances in accordance with AWS, Section 10.
  - 1. Fire-Rated doors shall conform to NFPA-80.

## **2.5 TRIM:**

- 1. Glazing Stops:
  - a. Match wood veneer of door panel.
  - b. Except as noted otherwise, provide solid wood stops
  - c. Where glazing is to be fire rated, provide stops as required to meet tested fire rating requirements. If metal stops are required, face to match veneer of door face.
- 2. Fasteners: Flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers unless required to be otherwise by tested, fire-rated assembly.

## **2.6 PREFINISH, PREFIT OPTION**

- A. Flush doors shall 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. AWS Finish System TR-5, Conversion Varnish.
  - 2. Use stain when required to match existing doors.

## **2.7 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.

## **2.8 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 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
- C. Provide cutouts for special details required and specified.
- D. Rout doors for hardware using templates and location heights as specified.
- E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness, undercut where shown.
- F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.
- G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

## **3.2 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.

1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Field-Finished Doors: Trimming to fit is acceptable.
- D. Adjust width of non-rated doors by cutting equally on both jamb edges.
- E. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
- F. Trim fire rated doors in accordance with NFPA 80.
- G. Use machine tools to cut or drill for hardware.
- H. Coordinate installation of doors with installation of frames and hardware.
- I. Coordinate installation of glazing.

### **3.3 APPLICATION OF HARDWARE**

- A. Install doors and hardware as specified in Section, 08 71 00, DOOR HARDWARE and applicable standards.

### **3.4 INSTALLATION TOLERANCES**

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for maximum diagonal distortion.

### **3.5 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Final adjustments are to be made after HVAC system testing and balancing is complete.

### **3.6 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 pre-installed knobs and handles in addition to covering door.
- C. Maintain covering in good condition until removal is approved by Resident Engineer.

--- END ---



**SECTION 08 16 13**  
**FIBERGLASS REINFORCED PLASTIC DOORS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies fiberglass reinforced plastic doors, frames, and accessories.

**1.2 RELATED WORK**

- A. Masonry; Section 04 20 00, UNIT MASONRY.  
B. Door hardware; Section 08 71 00, DOOR HARDWARE.  
C. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.  
B. Manufacturer's literature and data describing products provided under this Section.  
C. Unified Schedule: Submit a schedule containing doors, frames and hardware conforming to DHI "Sequences and Format for the Hardware Schedule" (A115 Series).  
D. Certifications:  
1. Certify that products meet requirements of current local, state and federal regulations.  
2. Certify that products conform to the requirements of this Section.  
3. Certification of manufacturer's qualifications.  
E. Operation and Maintenance Manual  
1. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use condition.  
2. Include recommendations for damage repair.

**1.4 MANUFACTURER'S QUALIFICATIONS**

- A. Manufacturer Qualifications: A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein with a minimum of 10 years documented experience and with a record of successful in-service performance for the applications as required for this project.

**1.5 DELIVERY, STORAGE AND PROTECTION**

- A. Deliver door and frame assemblies packaged in manufacturer's standard containers to provide protection during transit. Store, protect and handle products at project site in strict accordance with manufacturer's instructions to prevent damage to the finish of factory-finished doors and frames.

- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building under cover. Avoid using non-vented plastic or canvas covers that could create a humidity chamber.

## **1.6 WARRANTY**

- A. Warranty all fiberglass doors and frames materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.

## **1.7 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Architectural Manufacturer's Association (AAMA):
  - 920 .....Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems.
  - 1304 .....Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems
- C. American Society for Testing and Materials (ASTM)
  - D635 .....Method For Rate of Burning
  - E84 .....Surface Burning Characteristics of Materials
- D. Florida Building Code (FBC)
  - 201 .....Impact Test Procedures
- E. American National Standards Institute (ANSI):
  - A250.4-2001 .....Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings
  - A250.8 .....Recommended Specifications for Standard Steel Doors and Frames
- F. Steel Door Institute (SDI)
  - 117 .....Manufacturing Tolerances Standard Steel Doors and Frames
- G. Window and Door Manufacturers Association (WDMA – formerly NWWDA)

TM-7-08.....Cycle-Slam Test (formerly Test Method to Determine the  
Physical Endurance of Wood Doors and Associated Hardware  
Under Accelerated Operating Conditions)

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE CRITERIA**

- A. Swinging Door Test, Doors and Frames, AAMA 920-03, ANSI A250.4-2001, WDMA TM-7: In excess of 1,000,000 cycles.
- B. Forced Entry: Pass AAMA 1304
- C. Impact: Pass FBC 201, Large Missile Test with no permanent deformation.
- D. Flame Spread: 25 or less per ASTM E84
- E. Shall be self extinguishing per ASTM D635.
- F. Overall construction shall be water –tight, not permitting moisture to reach the core material(s).

### **2.2 MATERIALS**

- A. Fiber Reinforces Plastic Sheet: Class 1 premium resin with no fillers that is specifically tailored to resist chemicals and contaminants typically found in food processing applications. All fiberglass components including face plates, stiles and rails and frames must be fabricated by the same manufacturer.
  - 1. Base: 25 mil gelcoat of the color specified
  - 2. Multiple layers of 1.5 ounces per square foot fiberglass mat and one layer of 18 ounce per square yard fiberglass woven roving.
  - 3. Each layer shall be individually laminated with resin.
  - 4. Not less than 30 percent glass fiber by weight.
- B. Core materials option to be:
  - 1. Polypropylene plastic honeycomb core with a non woven polyester veil for unparalleled plate bonding, 180 PSI typical compression range.
  - 2. 2 PSF expanded polyurethane foam core, which completely fills all voids between the door plates. Foam properties ASTM E-84 comply with IBC Code.
  - 3. Core: Mineral core fire-rated as per schedule. (1/2 Hour, 3/4 Hour, 1 Hour, 1-1/2 Hour)
- C. Blocking and Reinforcements
  - 1. Non-swelling, polymer blocking. Metal reinforcement not acceptable.

**2.3 FRP DOORS**

- A. Thickness: 1 ¾ inch thick
- B. Face Construction:
  - 1. Sheet Thickness: 0.90 to 0.125 inch thick with test average of not less than 0.120 inches minimum.
  - 2. Top Gel Coat: 15 mils plus or minus 3 mils
- C. Surface Finish: Flush, smooth
- D. Construction: Seamless: no seams or cracks.
- E. All doors up to 4'0 x 8'0 shall have equal diagonal measurements.
- F. All exposed surfaces and joints shall be completely sealed and water tight with a continuous gel coat of not less than 15 mils plus or minus 3 mils.

**2.4 FRP FRAMES**

- A. Frame may be solid, foam-filled, or hollow, pultruded fiberglass or cellular PVC completely sealed with surface gel coat of not less than 15 mils plus or minus 3 mils to match door.
  - 1. For hollow frames, provide solid blocking at all points where hinges and other hardware is to be attached.
  - 2. Hollow frame to have reinforcing at corners.
  - 3. Hollow frames to have mortar guard boxes at all cut-outs in the frame.
  - 4. Frame shall have been tested according to ANSI A250.4-2001 to at least 1,000,000 cycles without noticeable damage or failure of frame or anchors.
- B. Joints shall be formed by mitering and finished to appear to be seamless.

**2.5 FABRICATION**

- A. Form exposed surfaces free from warp, wave and buckle, with all corners square, unless otherwise shown.
- B. Set each member in proper alignment and relationship to other members with all surfaces straight and in a true plane.
- C. Doors and frames shall be rigid.
- D. Exposed surfaces to be neat in appearance, continuous, and free of defects.
- E. Doors may be prehung in frames and packaged for shipping with spreaders and stabilizers as necessary.
- F. Provide reinforcement for all anchors and applied hardware as necessary. Follow manufacturer's recommendations and, to the extent applicable, conform to ANSI A250.8.

G. Tolerances:

1. Conform to SDI 117 for dimensional tolerances.
2. Conform to ANSI A250.8, level 3, for clearances.

**2.6 FASTENERS**

- A. Use only 316 stainless steel or polymer fasteners or other approved highly corrosion resistant fasteners.

**2.7 FINISHES, GENERAL**

- A. Surface gel coat shall be cured to strengthen bond to substrate and to improve physical wear resistance.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify openings are correctly prepared to receive doors and frames.
- B. Verify openings are correct size and depth in accordance with submittal drawings.

**3.2 INSTALLATION**

- A. Install door opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
- B. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
- C. Install plumb, square and free of twist of frames. Conform to manufacturer's printed tolerances. Brace securely until permanently anchored.
- D. Locate anchors where recommended by manufacturer.
- E. Fire labeled doors and frames shall be installed in strict accordance with manufacturer's instructions and the latest revision of NFPA 80.
- F. Remove temporary braces and spreaders necessary for installation only after frames have been properly set and secured.
- G. Grout hollow frames solid.

**3.3 ADJUSTING**

- A. Adjust doors in accordance with the door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instruction.

**3.4 CLEANING**

- A. Clean all exposed surfaces, removing dirt and excess sealant from all exposed surfaces.  
Follow the manufacturer's maintenance instructions for proper techniques and products to clean all surfaces.
- B. Remove debris and leave work in complete and proper operating conditions.

**3.5 PROTECTION OF INSTALLED PRODUCTS**

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

- - - E N D - - -

## **SECTION 08 31 13 ACCESS DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. 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-2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate,  
Sheet and Strip
  - A1008-07 .....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength  
Low-Alloy
- C. American Welding Society (AWS):
  - D1.3-98 .....Structural Welding Code Sheet Steel
- D. The National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 500 Series .....Metal Finishes Manual

### **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.

- C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

## **2.2 ACCESS DOORS, FIRE RATED:**

- A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120 degree C (250 degrees F).
- B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.
- C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel sheet, insulated sandwich type construction.
- D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.
  - 1. Weld exposed joints in flange and grind smooth.
  - 2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.
- E. Automatic Closing Device: Provide automatic closing device for door.
- F. Hinge: Continuous steel hinge with stainless steel pin.
- G. Lock:
  - 1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
  - 2. Provide latch release device operable from inside of door. Mortise case in door.

## **2.3 ACCESS DOORS, FLUSH PANEL:**

- A. Door Panel:
  - 1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
  - 2. Reinforce to maintain flat surface.
- B. Frame:
  - 1. Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed.
  - 2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
  - 3. Weld exposed joints in flange and grind smooth.
- C. Hinge:
  - 1. Concealed spring hinge to allow panel to open 175 degrees.

2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:

1. Flush, screwdriver operated cam lock.

**2.4 FINISH:**

- A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.
- B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

**2.5 SIZE:**

- A. Minimum 600 mm (24 inches) square door unless otherwise shown or required to suit opening in suspension system of ceiling.

**PART 3 - EXECUTION**

**3.1 LOCATION:**

- A. As shown on Drawings
- B. 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.

**3.2 INSTALLATION, GENERAL:**

- A. Install access doors in openings to have sides vertical in 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.
- D. Set recessed panel access doors recessed so that face of surrounding materials will finish on the same plane, when finish in door is installed.

**3.3 ANCHORAGE:**

- A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.
- B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.

**3.4 ADJUSTMENT:**

- A. Adjust hardware so that door panel will open freely.
- B. Adjust door when closed so door panel is centered in the frame.

--- E N D ---



**SECTION 08 36 13**  
**SECTIONAL OVERHEAD DOORS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies electrically operated thermal insulated sectional overhead steel doors.

**1.2 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, Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY 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-05.....Structural Steel
  - A227/A227M-06.....Steel Wire, Cold-Drawn for Mechanical Springs
  - A229/229M-99(R2005) Steel Wire, Oil-Tempered for Mechanical Springs
  - A653-07 .....Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy  
Coated (Galvanized) by the Hot Dip Process
  - C1036-06 .....Flat Glass
  - E84-07.....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.....Structural Performance of Exterior Windows, Curtain Walls,  
and Doors by the Uniform Static Air Pressure Difference.
  - E331-00.....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 1-03.....Motors and Generators
- E. National Fire Protection Association (NFPA):
  - 70 .....National Electrical Code
- F. National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 501-88 .....Metal Finishes Manual
- G. Underwriters Laboratory (UL)
  - 325-10 .....Door, Drapery, Gate, Louver, and Window Operators and  
Systems

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Steel: ASTM A653 for forming operations. ASTM A36 for structural sections.
- B. Hard Drawn Spring wire: ASTM A227.

- C. Oil Tempered Spring wire: ASTM A229.
- D. Glazing:
  - 1. Double strength glass (heat treated according to ASTM C1036 and ASTM C1048) or acrylic.
  - 2. Fabricated into sealed insulating glass 25 mm (one inch) thick.
- E. 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 1197 Pa (25 pounds per square foot) of door area without damage when tested in accordance with ASTM E330.
- B. Thermal Performance: Maximum U value of 0.10 for door when tested in accordance with ASTM C236.
- C. Air Infiltration: Maximum of 0.10 cfm at 24 Km (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. Minimum 20 gage (1 mm (0.0396 inches)) thick 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 600 mm (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 50 mm (2 inch) tracks and 12 gage for 75 mm (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. Manufacturer's 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. Power: 208 volts, single phase.
2. Motor conform to NEMA MG 1, maximum operation 3600 rpm.
3. Suitable for operation on current specified in Division 26, ELECTRICAL.
4. 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 0.20 to 0.30 m per second (8 to 12 inches per second), without exceeding the rated capacity.
5. Single-phase motors shall not have commutation or more than one starting contact.
6. 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. Manual 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. Use key activated switch on exterior requiring constant pressure to operate.
  - f. Limit switches: Manufacturers standard, position of switches readily adjustable.
5. Automatic Vehicle Loop Detector:
  - a. Loop detectors and control panel to be supplied with the door.
  - b. Provide pulse single to operate door on vehicle arrival at door.

- c. Automatic Environmental Tracking (Self-Tuning)
- d. Automatic Sensitivity Boost.
- e. Selectable Sensitivity Switch: Three levels: Maximum, Normal, Minimum.
- f. Reset Switch.
- g. Power:
  - 1) Input: 110 volts
  - 2) Output: Contact Rating 3 amp, 120v.
- h. Operating Temperature Range: -40 degrees F to +170 degrees F.
- 6. Operation:
  - a. All door operated by Manual Control Switches.
  - b. West door also operated by Automatic Vehicle Loop Detector.
  - c. Manual Control Switch Operation
    - 1) Open door upon activation of Open switch.
    - 2) Close door only when constant pressure applied.
  - d. Automatic Vehicle Loop Detector
    - 1) Open door upon signal from detector.
  - e. 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.
  - f. 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 Device:
  - a. Operator shall meet UL325 requirements for continuous monitoring of safety devices.
  - b. 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.

- c. 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.
- d. Do not use as a limit switch.
- e. Safety device connecting cable to motor to be flexible type SO cable with spring loaded automatic take up reel or equivalent device, as required for proper operation of the doors.

## **2.5 FINISHES:**

### **A. Steel:**

- 1. Comply with NAAMM's Metal Finishes Manual.
- 2. Surface: Smooth.
- 3. Clean surfaces free of scale, rust, oil and grease.
- 4. Galvanized steel: Apply phosphate treatment.
- 5. Provide 2-coat baked-on polyester finish.
- 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, Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY 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 9 mm (3/8 inch) diameter bolts, spaced near each end and not over 600 mm (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 13**  
**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies aluminum entrance work including storefront construction, and other components to make a complete assembly.

**1.2 RELATED WORK:**

- A. Automatic Bifold Door Entrances: 08 42 29, AUTOMATIC BIFOLD ENTRANCE DOORS.
- B. Glass and Glazing: Section 08 80 00, GLAZING.
- 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):
- B209-06 ..... Aluminum and Aluminum-Alloy Sheet and Plate
  - B221-05 ..... 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..... Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
  - F468-06..... Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
  - F593-04..... 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):
- CW 10-04..... Curtain Wall Manual No. 10-Care and Handling of Architectural Aluminum from Shop to Site.
  - 611-98 ..... Voluntary Specification for Anodized Architectural Aluminum
  - 2604-05 ..... High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels
- E. American Welding Society (AWS):
- D1.2-03 ..... 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 1.4 kilopascals (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).

- B. Air Infiltration: When tested in accordance with ASTM E 283, air infiltration shall not exceed  $2.63 \times 10^{-5}$  cm per square meter (0.06 cubic feet per minute per square foot) of fixed area at a test pressure of 0.30 kPa (6.24 pounds per square foot) 80 kilometers (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 0.38 kPa (8 pounds per square foot) of fixed area.
- D. Thermal Performance: Frame shall be thermally broken and have a frame only heat transfer coefficient (U-Value) not greater than 1.0.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

- A. Aluminum, ASTM B209 and B221:
  - 1. Alloy 6063 temper T5 for storefronts, fixed glass sidelights and transoms.
  - 2. Alloy 6061 temper T6 for extruded structural members.
  - 3. For color anodized finish, use aluminum alloy as required to produce specified color.
- 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 3 mm (0.125 inch) thick. Fabricate glazing beads of aluminum not less than 1.0 mm (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. Where concealed closers or other mechanisms are required, provide the necessary space, cutouts, and reinforcement for secure fastening.
- 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 and from contact with cementitious materials 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.
  - 4. Fixed, permanent plastic or polymer pads.

**2.4 FRAMES:**

- A. Fabricate frames, mullions, transoms, frames for fixed glass and similar members from extruded aluminum not less than 3 mm (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 MISCELLANEOUS COMPONENTS**

- A. Provide glazing beads, moldings, and trim of not less than 1.25 mm (0.050 inch) nominal thickness.
- B. Provide matching thermally broken sill receptors and head receptors.
- C. Provide matching break metal filler panels
- D. Provide internal reinforcing as required.

**2.6 FINISH**

- A. In accordance with NAAMM AMP 500 series.
- B. Comply with AAMA 611-98
- C. Color Finish: Chemically etched medium matte, with color anodic coating, Class I Architectural, 7 mils thick. See Section 09 06 00, SCHEDULE OF FINISHES.
- D. Entry door color and store front color shall match, whether by the same manufacturer or by different manufacturers.

**PART 3 - 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 3 mm (1/8 inch) in 2400 mm (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.

**3.2 ADJUSTING:**

- A. After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to insure proper performance.

**3.3 PROTECTION, CLEANING AND REPAIRING:**

- A. 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 42 29**  
**AUTOMATIC BIFOLD ENTRANCE DOORS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This Section includes the following types of folding automatic entrances:
  - 1. Exterior and interior, folding automatic entrances with integral transoms.
  - 2. Folding automatic entrances shall be configured as follows:
    - a. Four-Panel, Fold-In or Fold-Out.

**1.2 RELATED WORK**

- A. Sealing Joints. Section 07 92 00, JOINT SEALANTS.
- B. Aluminum hinged doors and storefront construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- C. Lock cylinders: Section 08 71 00, DOOR HARDWARE.
- D. Glazing: Section 08 80 00, GLAZING.
- E. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- F. Electrical Rough-in and Final Connections are specified in Division 26, ELECTRICAL .

**1.3 QUALIFICATIONS**

- 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. Manufacturer who regularly and presently, for last five years has manufactured and installed automatic entrance doors as one of its principal products.
    - b. Installer: Approved by manufacturer.
    - c. Manufacturer's product submitted has been in satisfactory and efficient operation on minimum of three installations similar and equivalent to this project for past three years.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain folding automatic entrances through one source from a single manufacturer.
- B. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of folding automatic entrances and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

If modifications are proposed, submit comprehensive explanatory data to Architect for review.

- C. Power Operated Door Standard: ANSI/BHMA A156.10.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

## **1.5 DEFINITIONS**

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- B. Safety Device: Device that prevents a door from opening or closing, as appropriate.

## **1.6 PERFORMANCE REQUIREMENTS**

- A. Provide folding automatic entrances capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).
- C. Entrapment Protection: The force required to prevent a stopped door, in the last 10 degrees of the opening, from moving in the direction of opening shall not exceed 40 lbf (180 N) applied at 1" (25 mm) from the leading edge of the FS leaf.
  - 1. Break Away Requirements: Folding automatic entrances provided with a breakaway device shall require no more than 222 N (50 lbf) applied at 25 mm (1") from the latch edge of the door to break door panels out. No header mounted stops, jamb mounted stops, or jamb mounted cams, shall be required for proper function of breakaway device. Breakaway system shall incorporate a disconnect switch to prevent powered operation while door is broken out.
- D. Weathertightness: Installed door shall pass AAMA 501.2 hose test.

## **1.7 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, hardware, components, and accessories.

3. Recommendations for maintenance and cleaning of exterior surfaces.

C. Shop Drawings:

1. Submit complete fabrication, installation, and associated components shop drawings.
2. Identify enclosures, speed control units, and other component parts, not included in manufacturer's product data, by name and material and showing design, construction, installation, and anchorage.
3. Layout and installation details, including relation to adjacent work.
4. Elevation at 1:50 (1/4 inch) scale.
5. Hardware, show mounting heights.
6. Detail sections of typical composite members.
7. Provisions for expansion and contraction.
8. Anchors and reinforcements.
9. Glazing details.
10. Equipment wiring diagram and electrical circuitry diagram for electric powered doors.

D. Samples:

1. Submit pairs of samples of each specified color and finish on 300 mm (12 inch) long section by width of each tubular, or extruded shape section or 300 mm (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. Quality Control Submittals:

1. Test Reports: Provide certified test reports from a qualified independent testing laboratory showing that automatic entrance door assembly has been tested in accordance with specified test procedures and complies with performance characteristics indicated.
2. Manufacturer's Certificates:
  - a. Stating that aluminum has been given specified thickness of anodizing or organic coating finish.
  - b. Indicating manufacturer's and installer's meet qualifications as specified.
  - c. Submit list of equivalent size installations which have had satisfactory and efficient operation.

**1.8 COORDINATION**

- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing folding automatic entrances to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of folding automatic entrances with connections to power supplies.

**1.9 PROJECT CONDITIONS**

- A. Verify openings to receive folding automatic entrances by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Provide templates to other trades when require to prepared conditions to receive entrance components.

**1.10 DELIVERY, STORAGE AND HANDLING**

- 1. Comply with AAMA CW-10.

**1.11 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced.  
Publications are referenced in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
  - CW 10-04.....Curtain Wall Manual No. 10-Care and Handling of Architectural Aluminum from Shop to Site.
  - 501.2-09 .....Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
  - 611-98 .....Voluntary Specification for Anodized Architectural Aluminum
  - 701-04 .....Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals
  - 2604-05 .....Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels.
- C. American Association of Automatic Door Manufacturers (AAADM)
  - 2846 .....Automatic Folding Door Checklist
- D. American National Standards Institute/Builders Hardware and Manufacturers Association (ANSI/BHMA):
  - A156.10-05 .....Power Operated Pedestrian Doors
  - A156.19-07 .....Power Assist and Low Energy Power Operated Doors.

- Z97.1-04.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
- E. American Society for Testing and Materials (ASTM):
- A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- A331-95 (R2000).....Steel Bars, Alloy, Cold-Finished.
- B209-06 .....Aluminum and Aluminum-Alloy Sheet and Plate.
- B221-06 .....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- E283-04.....Determining Rate of Air-Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across this Specimen.
- E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- E331-00.....Water Penetration of Exterior Windows Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- F. International Standards Organization (ISO):
- ISO 9001 .....Standard for Manufacturing Quality Management Systems
- G. National Association of Architectural Metal Manufacturer (NAAMM):
- 500 Series.....Metal Finishes Manual.
- H. National Fire Protection Association (NFPA):
- NFPA 101 .....Life Safety Code.
- NFPA 70 ..... National Electric Code.
- I. Underwriters Laboratories (UL):
- UL 325 .....Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

## **1.12 WARRANTY**

- A. Warranty: Submit manufacturer's written warranty for materials and installation, for period of three (3) years for revolving door units and five (5) years for speed control units and operator units.

**1.13 SERVICE**

- A. Include in contract price factory-trained technician to perform service and affect repairs for period of warranty. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- B. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Headers, stiles, rails, and frames: 6063-T6
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Sheet and Plate: ASTM B 209.
- B. Glass: Section 08 80 00, GLAZING, Type IGU-1
- C. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Sealants".

**2.2 AUTOMATIC ENTRANCE DOOR ASSEMBLIES**

- A. Provide manufacturer's standard folding automatic entrance assemblies including door panels, low profile hinges, framing, headers, door operators, electronic controllers, activation and safety devices, pivots, and accessories required for a complete installation.
- B. Folding Automatic Entrance Doors:
  - 1. Configuration: Four-Panel, Fold-In or Fold-Out
  - 2. Traffic Pattern: Two-way.
  - 3. Emergency Breakaway Capability: Full
  - 4. Mounting: Between jambs

**2.3 COMPONENTS**

- A. Framing Members: Manufacturer's standard extruded aluminum reinforced as required to support imposed loads.
  - 1. Nominal Size: 45 by 115 mm (1¾ inch by 4½ inch).
- B. Stile and Rail Door Panels: Manufacturer's standard 45 mm (1¾ inch) thick glazed door panels with extruded-aluminum tubular stile and rail members. Incorporate concealed tie-rods that span full length of top and bottom rails or mechanically fasten corners with reinforcing brackets that are welded.

1. Glazing Stops and Gaskets: Snap-on, extruded-security aluminum stops and preformed gaskets.
  2. Hinge and Lock Stile Design: Narrow stile; 51 mm (2 inch) nominal width.
  3. Fold Stile Design: Low profile; 25 mm (1 inch) nominal width.
  4. Bottom Rail Design: Minimum 102 mm (4 inch) nominal height.
  5. Muntin Bars: None.
- C. Glazing: Performed under Section 08 80 00, GLAZING. All Glazing shall be 25 mm (1 inch) tempered insulated glass units, unless otherwise specified.
- D. Header Case: Header case shall not exceed 152 mm (6") square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- E. Door Arm Assemblies: Door arm assembly shall consist of a forged steel arm which fastens into web of door panel top rail. All parts shall be concealed in the top web of the door. The door arm shall be splined to the operator drive spindle. The door arm assembly shall have no moving parts.
- F. Thresholds: Manufacturer's standard saddle type thresholds as indicated below:
1. Continuous standard tapered extrusion; double bevel.
  2. All thresholds to conform to details and requirements for compliance with local codes.
- G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.

## **2.4 FOLDING DOOR OPERATORS**

- A. Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.
1. Operation: Power opening and spring closing.
  2. Operator Type: Full energy.

3.     Handing: Non-handed; no tools required to change handing.
4.     Capacity: Rated for door panels weighing up to 350 pounds.
5.     Mounting: Concealed.
6.     Features:
  - a.     Adjustable opening and closing speeds.
  - b.     Adjustable opening and closing force.
  - c.     Adjustable back-check.
  - d.     Adjustable hold-open time between 0 and 30 seconds.
  - e.     Reverse on obstruction.
  - f.     Variable rate open/closed speed control.
  - g.     Closed loop speed control with active braking and acceleration.
  - h.     Variable obstruction recycle time delay.
  - i.     Optional Switch to open/Switch to close operation.
  - j.     When operators are provided in pairs, adjustable features are independently adjustable for each operator.
7.     Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.
8.     Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
9.     Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
10.    Consistent Cycle: The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open. Additionally, the range of the force shall be field adjustable to accommodate a wide range of on-site conditions.
11.    Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.

12. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 10 amps for entrances with operators in pairs, 5 amps for single operator entrances.

## **2.5 ELECTRICAL CONTROLS**

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position. Systems utilizing external magnets and magnetic switches are not acceptable.
- B. Life Cycle Data Counter: The microprocessor control shall incorporate a non-re-settable counter to track door operation cycles.
- C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
  1. Automatic Reset Upon Power Up.
  2. Main Fuse Protection.
  3. Electronic Surge Protection.
  4. Internal Power Supply Protection.
  5. Resettable sensor supply fuse protection.
  6. Software "Watchdog" protection in the case of software malfunction.
- D. Push Button Interface with LED: The controller shall have push button switches with LED readout to allow for selection or change of the following parameters: carpet or timer logic, single or dual door, activation options, normal back check or large back check, push-to-open assist on/off.
- E. Soft Start/Stop: A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
- F. Safety Search Circuitry: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

- G. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be software driven and shall be utilized via Palm® handheld interface. The following parameters may be adjusted via the configuration tool.
  - 1. Operating speeds and forces as required to meet ANSI/BHMA A156.10.
  - 2. Adjustable and variable features as specified.
  - 3. Firmware update.
  - 4. Trouble Shooting
    - a. I/O Status.
    - b. Electrical component monitoring including parameter summary.
  - 5. Entrance profile copy/paste.
  - 6. Software for local configuration tool shall be available as a free download from the swinging automatic entrance manufacturer's internet site.
- H. Provide auxiliary NO/NC contact for air curtain activation upon door open and deactivation on door close.
- I. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset and power will be resumed.

## **2.6 ACTIVATION AND SAFETY DEVICES**

- A. General: Provide activation and safety devices in accordance with ANSI/BHMA standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- B. Automatic Activation Motion Sensors: Motion sensors shall be mounted on the approach side of door to detect pedestrians in the activating zone, and provide a signal to open doors. Units shall incorporate K-band microwave frequency to detect all motion in the activation zone. Units shall be configurable for wide or narrow activation zones and shall be suitable for mounting heights up to 4 m (13 feet).
- C. Safety Device: Presence Detection: Provide presence detection system designed to sense people and objects in the swing zone prior to activation, and in the threshold zone during operation. System provided shall consist of overhead and threshold safety sensors. The

complete presence detection system shall meet the requirements of ANSI A156.10 and the following requirements:

1. Overhead Presence Sensors: Overhead presence sensors shall be active infrared type capable of sensing moving or stationary targets within the swing-zone. The unit shall function properly at mounting heights up to 2.69 m (8'-10") above the finish floor.
  2. Threshold Presence Detectors: Threshold presence detectors shall be self-contained, active infrared type, fully adjustable sensors that work in conjunction with motion sensors and overhead presence sensors provided. The sensor shall be energized simultaneously with the door-opening signal and shall emit an elliptical shaped infrared presence zone, centered on the doorway threshold line. The door shall close when both sensors detect a clear surveillance field.
- D. Guide Rails: Guide rails shall be provided manufactured from 12 mm x 12 mm (1/2 inch x 1/2 inch) T-6063 alloy aluminum. Length and height shall be minimum 914 mm x 914 mm (36 inch x 36 inch) and shall comply with requirements of ANSI A156.10. Finish shall match finish of folding automatic entrance.
- E. Door Panel Safety: Provide door panel safety systems as indicated below:
1. Silicone rubber finger guards at pivot stiles and at folding panels.
  2. Neoprene safety seals at lead edge of door panels.

## **2.7 HARDWARE**

- A. Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.
- B. Control Switch: Provide manufacturer's standard jamb mounted rocker switches to allow for full control of the folding automatic entrance. Controls to include, but are not limited to:
1. Power On/Off
  2. On/Off/Hold-Open
- C. Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- D. Weather Sweeps: Manufacturer's standard adjustable nylon brush sweep mounted to underside of door bottom.

## 2.8 FABRICATION

- A. Factory fabricate folding automatic entrance components to designs, sizes, and thickness indicated and to comply with indicated standards.
  - 1. Form aluminum shapes before finishing.
  - 2. Use concealed fasteners to greatest extent possible.
  - 3. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
  - 4. Reinforce members as required to receive fastener threads.
- B. Framing: Provide folding automatic entrances as prefabricated assemblies.
  - 1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
  - 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
  - 3. Form profiles that are sharp, straight, and free of defects or deformations.
  - 4. Prepare components to receive concealed fasteners and anchor and connection devices.
  - 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
- C. Door Panels: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.
- F. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.

## 2.9 ALUMINUM FINISHES

- A. In accordance with NAAMM AMP 500 series.
- B. Comply with AAMA 611-98
- C. Color Finish: Chemically etched medium matte, with color anodic coating, Class I Architectural, 7 mils thick. See Section 09 06 00, SCHEDULE OF FINISHES.
- D. Entry door color and store front color shall match, whether by the same manufacturer or by different manufacturers.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification of Conditions:
  - 1. Examine openings for revolving entrance doors; determine they are proper size; plumb; square; and level before installation is started.
  - 2. Examine setting surfaces, power wiring and conduit installation to verify they are proper for satisfactory, complete and operational installation.

### **3.2 PREPARATION**

- A. Coordination: Provide those responsible for related work with:
  - 1. Installation templates diagrams, details for setting equipment.
  - 2. Templates cast-in inserts for setting equipment.
  - 3. Electrical wiring diagrams details.
  - 4. Confirm electrical power requirements.
- B. Electrical: Coordinate before any rough-in work begins to review project in relation to revolving entrance door and control equipment. Explain details and precautions necessary to assure proper installation.

### **3.3 INSTALLATION**

- A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install folding automatic entrances/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 23 Sections.
- D. Glazing: Glaze folding automatic entrance door panels in accordance with, the Glass Association of North America (GANA) Glazing Manual, folding automatic entrance manufacturer's instructions, and published recommendations of glass product manufacturer.
- E. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weather tight installation.

**3.4 ADJUSTING**

- A. Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI/BHMA A156.10 by AAADM Certified Technician.
- B. Adjust doors to provide a tight fit at contact points and operate easily and rotate evenly.
- C. Adjust weather-stripping to make even contact with surfaces.
- D. Adjust speed control to conform to specifications.
- E. Adjust pressure required to collapse doors to amount specified.
- F. Fit, lubricate, and adjust hardware for ease of operation.

**3.5 CLEANING**

- A. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
- B. Remove excess glazing and sealant compounds, dirt, and other substances.
- C. Follow recommendations of door manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.
- D. Repair damaged finish to match original finish.

**3.6 FIELD QUALITY CONTROL**

- A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.
  - 1. Test operating functions in accordance with manufacturer's printed checklist.
  - 2. Correct defects revealed by tests. Retest corrected areas until functions are operating properly.
- B. Leak Testing: Perform AAMA 501.2 (hose test) on all exterior doors.

**3.7 DEMONSTRATION AND ACCEPTANCE**

- A. Instruct Owner's personnel in proper operation and maintenance of revolving entrance door equipment. Train personnel in procedures to follow in event of operational failures or malfunctions.
- B. Acceptance: At completion of project, and as a condition of acceptance, revolving entrance door equipment and systems shall be operated for a period of fifteen (15) consecutive calendar days without breakdown.

### **3.8 PROTECTION**

- A. Protect finished surfaces from damage during erection, and after completion of work.  
Strippable plastic coatings on colored anodized finish are not acceptable.

--- E N D ---



## **SECTION 08 71 00 DOOR HARDWARE**

### **1.1 SUMMARY**

- 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 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS, and SECTION 08 16 13, FIBERGLASS REINFORCED PLASTIC DOORS.
- C. Coordination with door operators: Section 08 71 13, AUTOMATIC DOOR OPERATOR and Section 08 71 16, LOW ENERGY POWER ASSIST DOOR OPERATORS
- D. Stone thresholds: 09 30 13, CERAMIC TILING
- E. Painting: Section 09 91 00, PAINTING.
- F. Sequence of Operation for security and electrical controlled doors: 28 13 11, PHYSICAL ACCESS CONTROL SYSTEM (PACS).

### **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. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.
- D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.
- E. All items of a single type shall be by the same manufacturer.

### **1.4 WARRANTY**

- A. Automatic door operators shall be subject to the terms of FAR Clause 52.24-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:
  - 1. Locks, latchsets, and panic hardware: 5 years.

2. Door closers and continuous hinges: 10 years.

## 1.5 MAINTENANCE MANUALS

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware.

## 1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23 plus 2 copies to the VAMC Locksmith (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. Unified Schedule: Submit a schedule containing doors, frames and hardware conforming to DHI "Sequences and Format for the Hardware Schedule" (A115 Series).
- D. Product Data: Provide product data sheet for each item appearing in the Hardware Schedule. Where multiple items appear on data sheet clearly indicate which are included in the schedule. Where multiple items on the same sheet apply, provide a mark by each item corresponding to their mark in the schedule.
- E. 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.
- F. 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.

- G. Certification of Hardware Professional: Submit proof of certification of Architectural Hardware Consultant.
- H. Record Documents: At the end of the project, provide a corrected hardware schedule and data sheets to show actual hardware installed at each opening. Note any special conditions.

## **1.7 QUALITY REQUIREMENTS**

- A. Hardware Supplier: Company specializing in supplying institutional door hardware with five years experience. Supplier shall provide an experienced person to consult with Architect, Owner, and Contractor throughout progress of the work, and to develop keying instructions.
- B. Hardware Supplier Personnel: Employ a certified Architectural Hardware Consultant (AHC) (as defined by the Door and Hardware Institute) to assist in the work of this section. AHC shall direct preparation of, review, and sign all submittals and shall inspect and provide a written report on installed hardware.

## **1.8 DELIVERY AND MARKING**

- A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Resident Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Resident Engineer's office until all other similar items have been installed in project, at which time the Resident Engineer will deliver items on file to Contractor for installation in predetermined locations on the project.

## **1.9 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. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Adams-Rite	Adams Rite Mfg. Co.	Pomona, CA
Best	Best Access Systems	Indianapolis, IN
Don-Jo	Don-Jo Manufacturing	Sterling, MA
G.E. Security	GE Security, Inc.	Bradentown, FL
Markar	Markar Architectural Products	Pomona, CA

NPG	National Guard Products	Memphis, TN
Pemko	Pemko Manufacturing Co.	Ventura, CA
Rixson	Rixson	Franklin Park, IL
Rockwood	Rockwood Manufacturing Co.	Rockwood, PA
Securitron	Securitron Magnalock Corp.	Sparks, NV
Southern Folger	Southern Folger Detention Equipment Co.	San Antonio, TX
Stanley	The Stanley Works	New Britain, CT
Tice	Tice Industries	Portland, OR
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA
Zero	Zero Weather Stripping Co.	New York, NY

C. Keying: Verify keying with the Owner's locksmith.

#### 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):

E2180-07.....Standard Test Method for Determining the Activity of Incorporated  
Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association  
(ANSI/BHMA):

A156.1-06 .....Butts and Hinges

A156.2-03 .....Bored and Pre-assembled Locks and Latches

A156.3-08 .....Exit Devices, Coordinators, and Auto Flush Bolts

A156.4-08 .....Door Controls (Closers)

A156.5-01 .....Auxiliary Locks and Associated Products

A156.6-05 .....Architectural Door Trim

A156.8-05 .....Door Controls-Overhead Stops and Holders

A156.16-08 .....Auxiliary Hardware

A156.17-04 .....Self-Closing Hinges and Pivots

A156.18-06 .....Materials and Finishes

A156.21-09 .....Thresholds

A156.22-05 .....Door Gasketing and Edge Seal Systems

A156.26-06 .....Continuous Hinges

A156.28-07 .....Master Keying Systems

A250.8-03 .....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):

80 .....Fire Doors and Fire Windows

101 .....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

1784 .....Air Leakage Test of Door Assemblies

Building Materials Directory (2008)

## **PART 2 - PRODUCTS**

### **2.1 BUTT HINGES**

- A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type 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.

## **2.2 CONTINUOUS HINGES**

- A. ANSI/BHMA A156.26, Grade 1-600.
  1. Listed under Category N in BHMA's "Certified Product Directory."
- B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete
- C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
  1. Base Metal for Exterior Hinges: Stainless steel.
  2. Base Metal for Interior Hinges: Steel.
  3. Base Metal for Hinges for Fire-Rated Assemblies: Steel.
  4. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
  5. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
  6. Provide with manufacturer's cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
  7. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
  8. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer's adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

## **2.3 DOOR CLOSING DEVICES**

- A. Closing devices shall be products of one manufacturer for each type specified.

## **2.4 OVERHEAD CLOSERS**

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
  1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
  2. Where specified, closer shall have hold-open feature.
  3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.

4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 1/2" (38mm) minimum piston diameter.

## **2.5 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 L02151 (rubber pads having convex face) to receive turn piece or button.
- D. Where bumper is applied to drywall provide concealed blocking.
- E. Provide stop Type L02131, 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.
- F. Omit stops where magnetic door holders are required and where automatic operated doors occur.
- G. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

- H. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.
- I. Where the specified wall or floor stop cannot be used, provide overhead stops Type C02541, ANSI A156.8.

## **2.6 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 surface mounted 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.

## **2.7 LOCKS AND LATCHES**

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. All locks and latches to have lever handles.
- B. All lock and latches shall conform to requirements of the Buy American Act.
- C. Cylinders: Cylinders for all locksets shall be removable core type. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset.
  - 1. Verify type of cylinder required with Owner's locksmith.
  - 2. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the installation of final cores.
  - 3. Provide cylinders and cores for locks specified under other sections including, but not limited to, 08 33 13, COILING COUNTER DOORS; 08 36 13, SECTIONAL OVERHEAD DOORS (POWER OPERATED); and 08 42 29, AUTOMATIC BIFOLD ENTRANCE DOORS.  
Cylinders to match those provided for the locks and latches under this section and to accept the same SFIC cores.
- D. 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.
- E. 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.
  - 1. All locks shall accept non-proprietary SFIC (Small Format Interchangeable Cores).

2. All locks/latches to be cylindrical lock/latches except locks indicated as Hospital Latch Sets or as indicated otherwise.
3. All lever to mechanical and storage rooms shall have knurled handles.
4. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension.
5. 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.)
6. 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).

## **2.8 AUXILIARY LOCKS**

- A. Conform to ANSI A156.5, Grade one.
- B. Deadbolt Throw: Not less than 1 inch.

## **2.9 KEYS**

- A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

<b>Locks/Keys</b>	<b>Quantity</b>
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	2 keys

## **2.10 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING**

- A. Conform to ANSI Standard A156.6.
- B. Provide protective plates and door edging as specified below:
  1. 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. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

## **2.11 EXIT DEVICES**

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.
- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

## **2.12 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).

**2.13 COORDINATORS**

- A. Conform to ANSI A156.3. 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.

**2.14 THRESHOLDS**

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a full bed of non-drying, non-skinning butyl sealant with 1/4-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- C. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) from frame face.
- D. All thresholds to conform to ANSI 117.1.
- E. Exterior thresholds shall be thermally broken.

**2.15 WEATHERSTRIPS (FOR EXTERIOR DOORS)**

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length ( $0.000774\text{m}^3/\text{s}/\text{m}$ ).

**2.16 OTHER GASKETING**

- A. At all smoke rated doors and other doors where specified, provide smoke seal conforming to ANSI A156.22, R0E154. Air leakage shall not to exceed 3.0 CFM per square foot ( $0.12424\text{m}^3/(\text{s}\cdot\text{m}^2)$ ) of door opening at 1.10 inch (24.9 Pa) of water for both the ambient temperature test and the elevate temperature exposure test when tested according the UL 1784.

**2.17 MISCELLANEOUS HARDWARE**

- A. 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 door with weather, smoke or other gasketing that will serve the same purpose. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors.

## 2.18 FINISHES/MATERIALS

- 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/Materials:
  - 1. Hinges --exterior doors: 630.
  - 2. Hinges --interior doors: 652 or 630.
  - 3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
  - 4. Thresholds: Mill finish aluminum.
  - 5. Other primed steel hardware: 600.
- D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces.
- 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<sup>+</sup>). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

## 2.19 BASE METALS

- A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

- B. All hardware for fiberglass doors to be highly chemical and corrosion resistant.

## 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 Resident Engineer for approval.

### 3.2 INSTALLATION

- A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be through-bolted 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 Resident Engineer. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.
- E. Hinges Required Per Door:

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

- F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.
- G. After locks have been installed; show in presence of Resident Engineer that keys operate their respective locks in accordance with keying requirements. 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. At the completion of the project, but not less than 2 months after hardware has been installed, Architectural Hardware Consultant (AHC) shall inspect installed hardware, ensure that any adjustments are made for proper functioning, and submitted a written report on functioning of all hardware including the following:
  - 1. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
  - 2. Identify items that have deteriorated or failed.

### 3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

### 3.5 HARDWARE SETS

- A. Following sets of hardware correspond to hardware sets marked in the Door Schedule on drawings. The hardware set numbers correspond to set numbers in the VA model specification. However they have been modify to correspond to the specific conditions in this institution. Do not assume the sets are the same as those in the model specification.
- B. Hardware set numbers are based on VA Standard Specification 08 71 00. VA Standard numbers are used, even though minor changes may have been made. If major changes have been made, an “x” is added to the number, however the base number is retained to indicate on which VA set the new set is based.

#### SECURITY HARDWARE ABBREVIATIONS LEGEND:

DEPH = Delayed Egress Panic Exit Device

DPS = Door Position Switch (Door or Alarm Contact)

ES = Electric Strike

MHO = Magnetic Hold-Open (wall- or floor-mounted)

ELR = Electric Latch Retraction Exit Device

REX = Request-to-Exit Switch in Latching Device Inside Trim

**C. INTERIOR SINGLE DOORS****HW-1R**

Doors: 1537, 1538, 1539, 1540, 1541, 1543, 1545, 1556, 1558-1, 1560

Each Door to Have:	RATED/NON-RATED
1 Continuous Hinge .....	A51031B
1 Hospital Latch (Bored lock, passage) .....	F75 x PADDLES POINTING DOWN
1 Kick Plate .....	J102
1 Closer (@ rated doors, only) .....	C02011/C02021 (PT4D, PT4F, PT4H)
1 Wall Stop .....	L52101 CONVEX
1 Set Self-Adhesive Seals .....	R0E154

**HW-1Rx**

Doors: 1546-2, 1548-2

Each Door to Have:	NON-RATED
1 Continuous Hinge .....	A51031B
1 Bored lock, Classroom .....	F84
1 Kick Plate .....	J102
1 Closer .....	C02011/C02021 (PT4D, PT4F, PT4H)
1 Wall Stop .....	L52101 CONVEX
1 Set Self-Adhesive Seals .....	R0E154

STONE THRESHOLD BY OTHER TRADES.

**HW-1Q**

Doors: 1544

Each Door to Have:	NON-RATED
1 Continuous Hinge .....	A51031B
1 Hospital Latch (Bored lock, passage) .....	F75 x PADDLES POINTING DOWN
1 Kick Plate .....	J102
1 Closer .....	C02051/C02061 (PT4D, PT4H)
1 Wall Stop .....	L52101 CONVEX
1 Threshold .....	J32300 x 57 mm width (2-1/4 inches)
1 Auto Door Bottom .....	R0Y346 – HEAVY DUTY
1 Sets Self-Adhesive Seals .....	R0E154

**HW-2B**

Doors: 1571, 1573

Each Door to Have:	NON-RATED
1 Center Pivot Set .....	C07042
1 Bore Lock, Privacy .....	F76B x THUMBTURN BOTH SIDES X OCCUPANCY INDICATOR
1 Rescue Stop .....	ES-1 (STANLEY), OR EQUAL
1 Custom Rescue Strike .....	CUSTOM DOUBLE-LIPPED (TICE), OR EQUAL
1 Kick Plate .....	J102
1 Mop Plate (@ Inswing Doors) .....	J102
1 Wall Stop .....	L52101 CONVEX

STONE THRESHOLD BY OTHER TRADES.

HW-2G

Doors: 1539A-1, 1539A-2, 1542, 1543A-1, 1543A-2

Each Door to Have:	RATED/NON-RATED
Hinges .....	QUANTITY & TYPE AS REQUIRED
1 Bore Lock, Privacy .....	F76B x THUMBTURN BOTH SIDES X
.....	OCCUPANCY INDICATOR
1 Kick Plate.....	J102
1 Wall Stop (where possible).....	L52101 CONVEX
1 Overhead Stops .....	C02541-ADJUSTABLE
2 Set Self-Adhesive Seals .....	R0E154

STONE THRESHOLD BY OTHER TRADES.

HW-3E

Doors: 1544B, 1570, 1575, 1575-ALT, 1575A, 1575B, 1577,

Each Door to Have:	NON-RATED
Hinges .....	QUANTITY & TYPE AS REQUIRED
1 Bored Lock, Entry .....	F82A
1 Wall Stop .....	L52101 CONVEX
1 Coat Hook .....	L03121

OMIT COAT HOOK WHERE GLASS LITE PREVENTS INSTALLATION.

HW-5B

Doors 0500-3, 0501

Each Door to Have:	NON-RATED/RATED
Hinges .....	QUANTITY & TYPE AS REQUIRED
1 Bored Lock, Passage.....	F75
1 Closer (used as stop) .....	C02011/C02021 (PT4D, PT4F, PT4H)
1 Armor Plate.....	J101 x 1.275 MM (0.050 INCH) THICKNESS
1 Set Self-Adhesive Seals .....	R0E154

HW-5D

Door: 1546-A, 1548-A,

Each Door to Have:	NON-RATED
Hinges .....	QUANTITY & TYPE AS REQUIRED
1 Bored Lock, Storeroom.....	F86
1 Overhead Stop (@ Outswing Doors) .....	C02541-ADJUSTABLE
1 Set Self-Adhesive Seals .....	R0E154

FIBERGLASS THRESHOLD

ALL HARDWARE IN THIS SET TO BE HIGHLY CHEMICAL AND CORROSION RESISTANT.

HW-5Dx

Door: 1546-1, 1548-1

Each Door to Have:	NON-RATED
Hinges .....	QUANTITY & TYPE AS REQUIRED
1 Bored Lock, Privacy .....	F76B
1 Wall Stop .....	L52101 CONVEX
1 Set Self-Adhesive Seals .....	R0E154

FIBERGLASS THRESHOLD

ALL HARDWARE IN THIS SET TO BE HIGHLY CHEMICAL AND CORROSION RESISTANT.

HW-5Dz

Door: 1558-2

Each Door to Have: NON-RATED

	Hinges .....	QUANTITY & TYPE AS REQUIRED
1	Bored Lock, Storeroom.....	F86
1	Deadbolt with Thumbturn and Occupancy Indicator.....	(Similar to Schlage B-571)
1	Kick Plate.....	J102
1	Wall Stop .....	L52101 CONVEX
3	Silencers.....	L03011

HW-6x

Door: C1506-2

Each [DEPH] Door to Have: RATED

	Hinges .....	QUANTITY & TYPE AS REQUIRED
1	Exit Device .....	TYPE 1, DELAYED EGRESS, Passage Function, LEVER .....Include INTEGRAL LOCAL ALARM (Battery powered)
1	Closer .....	C02011/C02021 (PT4D, PT4F, PT4H)
1	Wall Stop .....	L52101 CONVEX
1	Set Self-Adhesive Seals .....	R0E154

**D. INTERIOR DOUBLE DOORS**HW-11

Door 1547A

Each Pair to Have: NON-RATED/RATED

	Hinges .....	QUANTITY & TYPE AS REQUIRED
1	Manual Surface Bolts (one set).....	L04161
1	Storeroom Lock .....	F07
1	Astragal Stop.....	
2	Overhead Stops .....	C02541-ADJUSTABLE

HW-13

Doors 1574-1, 1574-2, 1574-3

Each [ADO] Bi-Parting Automatic Pair to Have: NON-RATED

ALL HARDWARE BY SECTION 08 42 29.

**E. EXTERIOR SINGLE DOORS**HW-E3

Doors: 0500-2

Each [DPS] Door to Have: NON-RATED

1	Continuous Hinge .....	A51031B x INTEGRAL HINGE GUARD CHANNEL	
			X ADJUSTA-SCREWS
1	Bored Lock, Storeroom.....		F86
1	Latch Protector (outswing dr) .....	MLP-111 (DON-JO), OR EQUAL	
1	Armor Plate .....	J101 x 3.125 MM (0.125 INCH) THICKNESS	
1	Overhead Holder .....	C02511-ADJUSTABLE	
1	Threshold (outswing door).....	J35130 x SILICONE GASKET	
1	Door Sweep.....	90100CNB (PEMKO), OR EQUAL	
1	Set Frame Seals.....	2891AS X CSK SCREWS (PEMKO), OR EQUAL	
1	Alarm Contact.....	1078-G (G.E. Security), or Equal	
1	Drip.....		R0Y976

Door to have Door Position Switch.

HW-E3x

Door: 1580

Each [DPS] Door to Have: NON-RATED

	Hinges .....	QUANTITY & TYPE AS REQUIRED	
1	Bored Lock, Storeroom.....		F86
1	Latch Protector (outswing dr) .....	MLP-111 (DON-JO), OR EQUAL	
1	Closer (cushion stop) .....	C02011/C02021 (PT4D, PT4H)	
1	Threshold (outswing door).....	J35130 x SILICONE GASKET	
1	Door Sweep.....	90100CNB (PEMKO), OR EQUAL	
1	Set Frame Seals.....	2891AS X CSK SCREWS (PEMKO), OR EQUAL	
1	Alarm Contact.....	1078-G (G.E. Security), or Equal	
1	Drip.....		R0Y976

Door to have Door Position Switch.

HW-E4x

Door: C1506-1

Each [DPS] Door to Have: NON-RATED

1	Continuous Hinge .....	A51031B	
1	Exit Device .....	TYPE 8, F03	
		PROVIDE MINIMAL EXTERIOR PULL SIMILAR TO TRIMCO #1822	
1	Key Cylinder.....	TYPE AS REQUIRED	
1	Closer (with cushion stop) .....	C02011 (PT4D, PT4F, PT4H)	
1	Threshold .....	J35190 x SILICONE GASKET	
1	Door Sweep.....	90100CNB (PEMKO), OR EQUAL	
1	Set Frame Seals.....	2891AS X CSK SCREWS (PEMKO), OR EQUAL	
1	Alarm Contact.....	1078-G (G.E. Security), or Equal	
1	Drip.....		R0Y976

Door to have Door Position Switch.

**F. EXTERIOR DOUBLE DOORS**HW-E8

Door 0500-1

Each [DPS] Pair to Have:	NON-RATED
2 Continuous Hinge .....	A51031B
2 Manual Surface Bolts (one set) .....	L04161
1 Bored Lock, Storeroom .....	F86 (Falcon T581)
1 Overlapping Astragal with..... Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2 Armor Plate .....	J101 x 3.125 MM (0.125 INCH) THICKNESS
2 Floor Stop .....	1214CK x 1268CK (TRIMCO), OR EQUAL
1 Threshold (outswing door).....	J35130 x SILICONE GASKET
2 Door Sweep.....	90100CNB (PEMKO), OR EQUAL
1 Set Frame Seals .....	2891AS X CSK SCREWS (PEMKO), OR EQUAL
1 Alarm Contact .....	1078-G (G.E. Security), or Equal
1 Drip .....	R0Y976

Door to have Door Position Switch.

HW-EX

Doors: 1576-1 (Alternate 3)

Each Pair to Have:	NON-RATED
2 Continuous Hinge .....	A51031B
1 Set Auto Flush Bolts .....	TYPE 25
1 Dust Proof Strike .....	L04021
1 Exit Device .....	TYPE 3 F03 LESS TRIM
1 Overlapping Astragal with..... Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
1 Coordinator .....	TYPE 21A
2 Closer .....	C02011/C02021 (PT4D, PT4F, PT4H)
2 Floor Stop .....	1214CK x 1268CK (TRIMCO), OR EQUAL
1 Threshold .....	J35130 x SILICONE GASKET
2 Door Sweep.....	90100CNB (PEMKO), OR EQUAL
1 Set Frame Seals .....	2891AS X CSK SCREWS (PEMKO), OR EQUAL
1 Drip .....	R0Y976

**G. SECURITY SINGLE DOORS**HW-SH-3Cx

Doors: 0500A, 1534, 1536

Each [ES, PIR, DPS] Door to Have:

NON-RATED/RATED

1	Continuous Hinge .....	A51031B x INTEGRAL HINGE GUARD CHANNEL	
	.....	X ADJUSTA-SCREWS	
1	Bored Lock Storeroom.....	F86	
1	Electric Strike .....	E59391 (FAIL-SECURE), 24VDC	
1	Power Supply .....	Regulated, Filtered, 24VDC, Amperage as required	
1	Bored Auxiliary Deadbolt.....	E0151	
1	Closer .....	C02011/C02021 (PT4D, PT4F, PT4H)	
1	Armor Plate .....	J101 x 1.275 MM (0.050 INCH) THICKNESS	
1	Edge Guard (@ Wood Doors) .....	J208M / J211 (VERIFY), CUT: HARDWARE	
1	Wall Stop .....	L52101 CONVEX	
1	Set Self-Adhesive Seals .....	R0E154	
1	Alarm Contact.....	1078-G (G.E. Security), or Equal	

DOOR CONTACTS BY OTHERS.

PIR MOTION DETECTOR

COORDINATE FOR DOOR PREPARATIONS AS NECESSARY AND COORDINATE PREP WORK IN DIVISION 28.

CARD READER BY DIVISION 28.

**H. SECURITY DOUBLE DOORS**HW-SH-8E

Doors: 1549-1, 1549-2

Each [ADO, PIR] Pair to Have:

NON-RATED

2	Continuous Hinges.....	A51031B x INTEGRAL HINGE GUARD CHANNEL	
	.....	X ADJUSTA-SCREWS x 4-THRUWIRE TRANSFERS	
	.....	X IN-HINGE ACCESS PANEL	
2	Push Plate .....	J304 8" x 16"	
2	Hospital Grip.....	J401	
2	Kick Plate.....	J102	
2	Mop Plate (@ Inswing Doors).....	J102	
2	Edge Guard (@ Wood Doors) .....	J208M / J211 (VERIFY), CUT: HARDWARE	
2	Silencers.....	L03011	

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13, AUTOMATIC DOOR OPERATORS.

POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).

CARD READER BY DIVISION 28 (@1549-1), PUSH BUTTON (@1549-2)

PIR MOTION DETECTOR

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

HW-SH-11x

Door 1576-2

Each [MHO] Pair to Have:

NON-RATED

	Hinges .....	QUANTITY & TYPE AS REQUIRED
2	Exit Device .....	TYPE 7 F03
2	Closers .....	C02011/C02021 (PT4D, PT4F, PT4H)
2	Edge Guard (@ Wood Doors) .....	J208M / J211 (VERIFY), CUT: HARDWARE
2	Kick Plates .....	J102
2	Magnetic Holder .....	C00011 TRI-VOLTAGE
1	Set Self-Adhesive Seals .....	R0E154

POWER, WIRING, CONDUIT, AND PUSH BUTTON RELEASE FROM SECURITY OFFICE:  
CONNECTION BY DIVISION 26.

HW-SH-12Hx

Doors: 1547-1 (Double Egress), 1576-1 (Base Bid)

Each [ADO, ELR] Pair to Have:

RATED

2	Continuous Transfer Hinge.....	A51031B x INTEGRAL HINGE GUARD CHANNEL
	.....	X ADJUSTA-SCREWS x 8-THRUWIRE
	.....	TRANSFER X IN-HINGE ACCESS PANEL
1	Electric Exit Device (rod retraction).....	TYPE 8 F01
1	Electric Exit Device (rod retraction).....	TYPE 8 F08 LEVER
1	Key Cylinder.....	TYPE AS REQUIRED
2	Power Supply .....	BY EXIT DEVICE MFR. FOR FUNCTION INDICATED
2	Door Operators (Low Power) .....	ANSI/BHMA A156.19
1	Set Meeting Stile Astragals.....	R3E834
2	Kick Plates .....	J102
2	Sets Self-Adhesive Seals.....	R0E154

POWER TRANSFERS SHARED BY ELECTRIC PANIC AND RE-ACTIVATION SENSOR  
WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 16).  
AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 16.  
CARD READER BY DIVISION 28.

- - - E N D - - -



**SECTION 08 71 13**  
**AUTOMATIC DOOR OPERATORS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies equipment, controls and accessories for automatic operation of swing doors.

**1.2 RELATED WORK**

- A. Door hardware; Section 08 71 00, DOOR HARDWARE.
- B. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.
- C. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.
- D. Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEM (PACS).
- E. Section 28 31 00, FIRE DETECTION AND ALARM.

**1.3 QUALITY ASSURANCE**

- A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.
- B. One type of automatic door equipment shall be used throughout the building.
- C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

**1.4 WARRANTY**

- A. Automatic door operators for a period of two years in lieu of one year.

**1.5 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.
- C. Shop Drawings:
  - 1. Showing location of controls and safety devices in relationship to each automatically operated door.
  - 2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
  - 3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.
- D. Submit in writing to Resident Engineer that items listed in Article 1.3 are in compliance.

- A. Maintenance Manuals: Furnish maintenance manuals and instructions on automatic door operators.

## **1.6 DESIGN CRITERIA**

- A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in seven seconds maximum time interval, when speed adjustment is at maximum setting.
- B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.
- C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

## **1.7 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. Builders Hardware Manufacturers Association, Inc. (BHMA):  
A156.10-05 .....Power Operated Pedestrian Doors (BHMA 1601)
- C. National Fire Protection Association (NFPA):  
101 .....Life Safety Code
- D. Underwriters Laboratory (UL):  
325-10 .....Door, Drapery, Gate, Louver, and Window Operators and  
Systems

## **1.8 DELIVERY AND STORAGE**

- A. Delivery shall be in factory's original, unopened, undamaged container with identification labels attached.

## **PART 2 - PRODUCTS**

### **2.1 SWING DOOR OPERATORS**

- A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom.
- B. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted

with provisions for easy maintenance and replacement, without removing door from pivots or frame.

1. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.
  2. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated.
  3. Opening and closing speeds shall be adjustable:
- C. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
- D. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
- E. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames.
- F. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.
- G. Power Operation:
1. Operator shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop.
  2. The door shall be held open by low voltage applied to the continuous duty motor.
  3. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power, or controlled by hydraulic closer in electro-hydraulic operators.

## **2.2 INTERNAL ELECTRICAL CONTROL:**

- A. Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.
- B. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options.

- C. Control shall be capable of receiving activation signals from any device with normally open dry contact output.
- D. All activation modes shall provide fully adjustable opening speed:
- E. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed.
- F. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle.
- G. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure.

### **2.3 POWER UNITS**

- A. Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

### **2.4 ACTIVATION DEVICES**

- A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.
- B. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (1/2-inch) high letters "To Operate Door--Push" engraved on face of plate.
  - 1. See Section 28 13 11, PHYSICAL SECURITY CONTROL SYSTEM (PACS), PART 4- SEQUENCE OF OPERATION for additional information locations
- C. Motion Detector: Surface mounted motion detector to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm (five feet) deep and 1500 mm (five feet) across, plus or minus 150 mm (six inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.
  - 1. Provide as activator at exterior side of interior pair of doors and at both sides of exterior pair of doors to activate and detect intrusion.
  - 2. Provide at interior side of interior doors only to detect intrusion and prevent closure when an object is present, BUT NOT TO ACTIVATE.

## **2.5 SAFETY DEVICES**

- A. Provide safety devices required by and conforming to ANSI 156.10.
- B. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.
- C. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.
- D. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.
- B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.
- C. Operators shall be adjusted and must function properly for the type of traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization.
- D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

### **3.2 INSTRUCTIONS**

- A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 2 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.
- B. Coordinate instruction to VA personnel with VA Resident Engineer.

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**SECTION 08 71 16**  
**LOW ENERGY POWER ASSIST DOOR OPERATORS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies equipment, controls and accessories required to provide low energy power assisted automatic operation of swing doors. The door operator system shall be complete including operator, controls, door arm and operator enclosure (header and cover).

**1.2 RELATED WORK**

- A. Sealants; Section 07 92 00, JOINT SEALANTS.
- B. Steel doors; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- C. Door hardware; Section 08 71 00, DOOR HARDWARE.
- D. Finish Color, Section 09 06 00, SCHEDULE FOR FINISHES.
- E. Smoke detectors for control of fire/smoke doors to be wired per Section 28 31 00, FIRE DETECTION AND ALARM.
- F. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

**1.3 MANUFACTURER'S QUALIFICATIONS**

- A. Power assisted door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.
- B. One manufacturer of automatic door equipment shall be used throughout the project.

**1.4 WARRANTY**

- A. Power assisted door operators, controls and other related equipment shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the warranty period shall be two years in lieu of one year.

**1.5 MAINTENANCE MANUALS**

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS," furnish three copies of maintenance manuals and instructions on automatic door operators.

**1.6 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

- B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.
- C. Shop Drawings: Showing location of controls and safety devices in relationship to each automatically operated door. This includes templates, wiring diagrams, fabrication details, anchorage and other information to providers of related work to coordinate the proper installation of the door operators.

## **1.7 DESIGN CRITERIA**

- A. Power assisted automatic door equipment shall accommodate normal traffic as well as the weight of the doors.
- B. Equipment: UL approved and comply with applicable codes. Motors shall be rated minimum one-quarter horsepower and shall be single phase and 115 volts.
- C. Electrical Wiring; Provide wiring so that only a single power supply is required. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

## **1.8 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute (ANSI):  
 ICC/ANSI A117.1-03 ...Guideline for Accessible and Usable Buildings and Facilities-  
 Providing Accessibility and Usability for Physically  
 Handicapped People
- C. Builders Hardware Manufacturers Association, Inc. (BHMA):  
 156.19-07 .....Power Assist and Low Energy Power Operated Doors

## **PART 2 - PRODUCTS**

### **2.1 OPERATORS**

- A. Operators shall conform to ANSI/BHMA 156.19.
  - 1. Low Energy Power Operated, Low Energy Power Open and Power Assist Operators shall be cycle tested, without failure, for 300,000 cycles.
- B. Automatic door operators shall be for institutional doors and shall be electromechanical and surface mounted above the door to the header or transom bar. The opening force shall be generated by a permanent magnet DC motor driving a combination spiral bevel/spur gear reducer and transmitted to the door through an arm linkage.
- C. Operator shall be swinging type enclosed in housing.

- D. Swing Power Operator: Completely assembled and sealed unit which shall include helical gear drive transmission, mechanical spring and bearings, all located in cast aluminum case and filled with special lubricant for extreme temperature conditions. A "DC" shunt-wound permanent magnet motor with sealed ball bearings shall be attached to transmission system. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.
- E. Swing Operator Housing: Motor and all mechanisms except the activator arm connected to the door shall be fully enclosed. All structural sections shall have a minimum thickness of 3.7 mm (0.146 inch) and be fabricated of 6063-T5 aluminum alloy. Enclosure shall be easily opened or removed to permit access for servicing. Finish and color as indicated.
- F. Connecting hardware for swing overhead concealed type power operator shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing and adjustable slide block, traveling in an interconnected track and top pivot assembly. Top track and pivot assembly shall be fabricated of steel. Door shall not pivot on shaft of operator.
- G. Operation:
  - 1. Operator shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop.
  - 2. Opening speed shall be adjustable and feature dual backcheck control allowing adjustment of backcheck speed and position.
  - 3. Closing shall be by spring force generated by a metal compression spring. The spring shall reduce manual opening force to not more than 67 N (15 lbf). The minimum diameter of spring wire shall be .007mm (172 in.). Under the specified design load of the door, the spring shall be capable of performing 2,000,000 cycles before fracture. Adjustable closing speed and fixed latch speed shall control the door in the closing cycle.
  - 4. Operators shall recycle doors instantaneously to full open position from any point in closing cycle when control switch is reactivated.
  - 5. The doors shall be operated manually at any time without damage to the operator or components.
  - 6. All operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
  - 7. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

## 2.2 ELECTRICAL CONTROLS

- A. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. Relays shall be plug-in type for individual replacement and all connecting harnesses shall have interlocking plugs. Control shall also include time delay for normal cycle. Swing door control shall include safe-swing circuit with optional switching which automatically limits power and slows door when approached from the doors swing area.
- B. The system shall include a multi-function microprocessor control providing adjustable hold open time (1 – 30 sec.), LED indications for actual position unknown, system status, open obstruction shutdown, activation signal, safety mat/sensor signal, Stop-and-Hold signal, and mode selector switches providing a means for easy field selection of the following functions: push-to-operate, latch assist and stack pressure. Control shall be capable of receiving activation signals from any device with normally open dry contact output.
  - 1. With push-to-operate function enabled, the control shall provide a means of initiating a self-start activation circuit by slightly pushing the door open at any point in the door swing.
  - 2. Latch Assist shall provide a two second impulse in the close direction to overcome restrictions with locking devices of pressure differentials, allowing the unit to operate in standard time delay mode, and permitting the door to close from the full open position after the hold time is satisfied. All activation modes shall provide fully adjustable opening speed.
- C. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and shuts the motor off if an open obstruction is sensed. The control shall include a recycle feature the reopens the door if an obstruction is sensed at any point during its closing cycle.
- D. The control shall include a standard three position toggle switch with functions for ON, OFF, and HOLD OPEN.

## 2.3 POWER UNIT

- A. Provide separate self-contained electric circuits for automatic operators located on each floor of the building. Interruption or failure of power circuits for operators located on one floor of the building shall not interfere with continuous performance of automatic operated

doors located on other floors. Capacity and size of power circuits shall be in accordance with automatic operator manufacturer's specifications.

## **2.4 ACTIVATION DEVICES**

- A. Automatic: Opening cycle shall be activated by pressing switches with international symbol of accessibility and "PRESS TO OPERATE DOOR" engraved on the faceplate. Switches shall be installed in a standard 2-gang electrical wall box and placed in a location in compliance with ANSI A117.1. Switches may be wall mounted or mounted on a free standing post or guard rail.
- B. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (1/2-inch) high letters "To Operate Door--Push" engraved on face of plate.
  - 1. Provide at non-secure side of door.
  - 2. Pushing plate to retract rods of exit device and then active door operators
- C. Electronic Activation: Where indicated provide a card reader in lieu of push button.
  - 1. Provide at secure side of door
  - 2. When activated, retract rods of exit device and then active door operators

## **2.5 SAFETY DEVICES**

- A. Time delay switches shall be adjustable between 5 to 60 seconds and shall control closing cycle of doors.
- B. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown and shall conform to the requirements of ANSI/BHMA A156.19.
- C. Each swing door shall have installed a motion sensor to detect any person standing in the door swing path and prevent the door from opening.
  - 1. Motion sensors shall consist of detection modules, factory prepared to be attached to each side of the lock/strike stile, an armored flex link power cable and bracket assembly, factory prepared for attachment to the pivot stile; a logic board and a position encoder which shall mount to the operator. The detection modules shall contain transmitting and receiving diodes and sense multidimensional zones for detection of people and/or objects in the door area.
  - 2. Detection modules shall be high impact, shock resistant zinc castings with tinted lenses.

3. The swing door sensor system shall provide complete operate and safety zone coverage. These zones shall be fully adjusted to meet specific jobsite conditions (sidewalls, adjacent panels, etc.)
  4. The system shall not be affected by ultrasonic, ambient light or radios frequencies within the vicinity of the swing door.
- D. Each swing door shall have installed a re-activation sensor mounted on the push-side door face near the top detect any person standing in the door swing path and prevent the door from closing. Wiring for the re-activation sensor between the door and frame shall be concealed in a power transfer device, hinge or pivot provided under Section 08 71 00; wire chase in door provided under door section.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment in finish work.
- B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.
- C. Operators shall be adjusted and must function properly for the type of traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.
- D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

#### **3.2 INSTRUCTIONS**

- A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 2 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.
- B. Coordinate instruction to VA personnel with VA Resident Engineer.

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**SECTION 08 80 00  
GLAZING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

**1.2 RELATED WORK**

- A. Factory glazed by manufacturer in following units:
1. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.

**1.3 LABELS**

- A. Temporary labels:
1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
  2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
  3. Temporary labels shall remain intact until glass is approved by Resident Engineer.
- B. Permanent labels:
1. Locate in corner for each pane.
  2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
    - a. Tempered glass.
    - b. Laminated glass or have certificate for panes without permanent label.
    - c. Organic coated glass.

**1.4 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Certificates:
1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
- 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. Elastic compound for metal sash glazing.
  3. Glazing cushion.

4. Sealing compound.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

## **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

## **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 and Materials (ASTM):
  - C1363-05 .....Thermal Performance of Building Assemblies, by Means of A  
Hot Box Apparatus
  - C542-05 .....Lock-Strip Gaskets.
  - C716-06 .....Installing Lock-Strip Gaskets and Infill Glazing Materials.
  - C864-05 .....Dense Elastomeric Compression Seal Gaskets, Setting Blocks,  
and Spacers.
  - C920-05 .....Elastomeric Joint Sealants.
  - C1036-06 .....Flat Glass.
  - C1048-04 .....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and  
Uncoated Glass.
  - C1172-03 .....Laminated Architectural Flat Glass.
  - C1349-04 .....Architectural Flat Glass Clad Polycarbonate.
- C. Code of Federal Regulations (CFR):
  - 16 CFR 1201 .....Safety Standard for Architectural Glazing Materials; 1977, with  
1984 Revision.
- D. National Fire Protection Association (NFPA):
  - 80 .....Fire Doors and Windows.
- E. National Fenestration Rating Council (NFRC):

Certified Products Directory (Latest Edition).

F. Safety Glazing Certification Council (SGCC):

Certified Products Directory (Issued Semi-Annually).

## **PART 2 - PRODUCT**

### **2.1 GLASS**

- A. Use thickness stated unless specified otherwise in assemblies.
- B. G-1: Clear Glass:
  - 1. ASTM C1036, Type I, Class 1, Quality q3.
  - 2. Thickness: As indicated, 6 mm (1/4 inch) minimum.
- C. G-3: Wired Flat Glass (With laminated film for impact resistance):
  - 1. ASTM C1036, Type II, Class 1, Form 1, Pattern Pl, Finish F1, Quality Q5, Mesh m1.
  - 2. Comply with 16 CFR 1201 test requirements for Category II.
  - 3. Thickness: As indicated, 6 mm (1/4 inch) minimum.

### **2.2 HEAT-TREATED GLASS**

- A. Type G-2 - Clear Tempered Glass.
  - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
  - 2. Comply with 16 CFR 1201 test requirements for Category II.
  - 3. Thickness: Minimum 6 mm (1/4 inch).

### **2.3 LAMINATED GLASS**

- A. Interlayer between glass panes: ASTM C 1172. Use heat and light stable polyvinyl butyl (PVB)
- B. Use 0.75 mm (0.030 inch) thick PVB for vertical glazing where 1.5 mm (0.060 inch) PVB is not otherwise indicated or required.
- C. Comply with 16 CFR 1201 test requirements for Category II.

### **2.4 INSULATING GLASS UNITS**

- A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space.
- B. Assemble units using glass types specified:
  - 1. Conform to ASTM E774, Class C performance requirements.
  - 2. Air Space approximately 13 mm (½ inch) wide.
  - 3. U value: Not greater than 0.40.
  - 4. Solar Heat Gain Coefficient (SHGC): Not greater than 0.40
- C. IGU-1 Clear Glass, Blast Resistant:
  - 1. Exterior pane Clear Tempered Glass 6 mm (1/4 inch) thick, low-E.

2. Interior pane Clear Laminated Glass 6 mm (1/4 inch) thick, minimum

## **2.5 GLAZING ACCESSORIES**

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.
- B. Setting Blocks: ASTM C864:
  1. Channel shape; having 6 mm (1/4 inch) internal depth.
  2. Shore A hardness of 80 to 90 Durometer.
  3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
  4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
  5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
- C. Spacers: ASTM C864:
  1. Channel shape having a 6 mm (1/4 inch) internal depth.
  2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
  3. Lengths: One to 25 to 76 mm (one to three inches).
  4. Shore A hardness of 40 to 50 Durometer.
- D. Sealing Tapes:
  1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
  2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.

## **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.
  1. Do not proceed with installation until unsatisfactory conditions have been corrected.

- C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

### **3.2 PREPARATION**

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

### **3.3 INSTALLATION - GENERAL**

- A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

### **3.4 INSTALLATION - DRY METHOD (TAPE AND DRY GLAZING STOP)**

- 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 1/3 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Trim protruding tape edge.

**3.5 REPLACEMENT AND CLEANING**

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

**3.6 PROTECTION**

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

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## **SECTION 08 90 00 LOUVERS AND VENTS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies fixed and operable wall louvers, door louvers and wall vents.

#### **1.2 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 and vent.

#### **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. The Master Painters Institute (MPI):
  - Approved Product List – February 2002
- C. American Architectural Manufacturers Association (AAMA):
  - 2604-05 ..... Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
- D. Air Movement and Control Association, Inc. (AMCA):
  - 500-L-07 ..... Laboratory Methods of Testing Louvers for Rating.
  - 511-07 ..... Certified Ratings Program for Air Control Devices
- E. American Society for Testing and Materials (ASTM):
  - B209/B209M-04 ..... Aluminum and Aluminum Alloy, Sheet and Plate
  - B221/B221M-05 ..... Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- F. National Association of Architectural Metal Manufacturers (NAAMM):
  - Metal Finishes Manual (1988 Edition)
  - AMP 500 ..... Metal Finishes Manual
- G. National Fire Protection Association (NFPA):
  - 90A ..... Installation of Air Conditioning and Ventilating Systems

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Aluminum, Extruded: ASTM B221/B221M.
- B. Aluminum, Plate and Sheet: ASTM B209/B209M.
- C. 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.

### **2.2 EXTERIOR WALL LOUVERS**

- A. General:
  - 1. Provide fixed type louvers of size and design shown.
  - 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 extension or separate sill as shown.
  - 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.
  - 2. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified under AMCA 511
    - a. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf (1.2 kPa) without damage or permanent deformation.
    - b. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft (3.1 g/sq m) water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L
  - 3. Louvers shall bear AMCA certified rating seals for air performance and water penetration ratings.
- C. Aluminum Louvers:
  - 1. General: Frames, blades, sills and mullions (sliding interlocking type); 2 mm (0.081-inch) thick extruded aluminum. Blades shall be standard type and have reinforcing bosses.

2. Louvers, fixed: Make frame sizes 13 mm (1/2-inch) smaller than openings. Single louvers frames shall not exceed 1700 mm (66 inches) wide. When openings exceed 1700 mm (66 inches), provide twin louvers separated by mullion members.

D. Provide 0.8 mm (0.032-inch) thick aluminum sleeves in cavity walls if required.

### **2.3 CLOSURE ANGLES AND CLOSURE PLATES**

- A. Fabricate from 2 mm (0.074-inch) thick stainless steel or 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. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.
- B. Fabricate frames from 2 mm (0.081-inch) thick extruded or sheet aluminum or 1.5 mm (0.059-inch) thick stainless steel designed to retain wire mesh.
- C. Bird Screen: Wire mesh shall be woven from not less than 1.6 mm (0.063-inch) diameter aluminum wire or 1.3 mm (0.05-inch) diameter stainless steel wire in 13 mm (1/2-inch) square mesh.
- D. Insect Screen: 18 x 16 size aluminum mesh.
- E. Miter corners and join by concealed corner clips or locks extending about 57 mm (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.
- F. Fasten frames to outside of louvers with aluminum or stainless steel devices designed to allow removal and replacement without damage to the wire guard or the louver.

### **2.5 FINISH**

- A. In accordance with NAAMM Metal Finishes Manual:
- B. Aluminum Louvers Air Intake Vents and Wire Guards:
  1. Organic Finish: AAMA 2604 (High Performance Fluorocarbon coating).

### **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 plaster, concrete and 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 organic 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. Set in cast-in-place concrete in prepared openings.

#### **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.

- - - E N D - - -

**SECTION 09 06 00  
SCHEDULE FOR FINISHES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

**1.2 MANUFACTURERS**

- A. Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

**1.3 SUBMITTALS**

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES-provide quadruplicate samples for color approval of materials and finishes specified in this section.

**1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. MASTER PAINTING INSTITUTE: (MPI)

2001 .....Architectural Painting Specification Manual

**PART 2 - PRODUCTS**

**2.1 DIVISION 03 – CONCRETE**

- A. SECTION 03 30 00, CAST IN PLACE CONCRETE

Surface	Finish Description
Exposed Slab – Interior and Exterior	Liquid Densifier / Penetrating Sealer - Clear

## A. SECTION 03 45 00, PRECAST ARCHITECTURAL CONCRETE

Mark	Finish	Manufacturer	Mfg. Color Name/No.
Insulated Precast Wall Panel	Thin Brick	Glen Gery	Red Colonial Modular Brick – 60 Percent Maroon Colonial Modular Brick – 20 Percent Terra Cotta Colonia Modular Brick – 20 Percent
	Stain (on exposed concrete accent band)	-	Match color of Architectural CMU

## 2.1 DIVISION 04 – MASONRY

## A. Section 04 20 00, UNIT MASONRY

Mark	Finish	Manufacturer	Mfg. Color Name/No.
Brick		Glen Gery	Match color mix defined in Section 03 45 00 for Thin Brick
Arch CMU	Groundface	Northfield Block Co.	Cordova Stone Masonry Unit color as selected by Architect

## 2.1 DIVISION 05 – METALS

## A. SECTION 05 51 00, METAL STAIRS

Component	Finish	Color
Risers, Treads, Stringers and Structure	Exposed galvanized steel	---
Handrails and Guardrails	Exposed galvanized steel	---

## 2.2 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

## A. SECTION 06 20 00, FINISH CARPENTRY

Mark	Fabrication	Manufacturer	Mfg. Color Name/No.

## B. SECTION 06 61 13, SOLID SURFACING FABRICATIONS

Mark	Fabrication	Manufacturer	Mfg. Color Name/No.
--	Countertops	Corian	Granola (F)

## C. SECTION 06 64 19, DECORATIVE TRANSLUCENT PLASTIC PANELS

Mark	Fabrication	Manufacturer	Mfg. Color/ Pattern Name
--	Glazing Panels	3Form	Varia Organic Bamboo Rings Natural

## 2.3 DIVISION 07 - THERMAL AND MOISTURE PROTECTION

## A. SECTION 07 42 64, METAL COMPOSITE MATERIAL WALL PANELS

Finish Code	Finish	Manufacturer	Mfg. Color Name/No.
---	Smooth PVDF on Alum	---	Metallic to Match Storefront

## B. SECTION 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING

Color	Manufacturer	Mfg. Color Name/No.
--	---	Black

## C. SECTION 07 71 29, ROOF MOVEMENT JOINT COVERS

Type	Manufacturer	Mfg. Color Name/No.
Membrane Billows	---	Black
Formed Metal Coping	---	To be selected by the Architect from the full range of colors, including metallics

## D. SECTION 07 92 00, JOINT SEALANTS

1. See Schedule at the end of Section 07 92 00 for type. Colors to be selected by Architect.

## E. SECTION 07 95 13, EXPANSION JOINT COVER ASSEMBLIES

	Material	Finish	Manufacturer	Mfg. Color Name/No.
Interior Floor	Flat Stainless Steel Plate	Mill	---	----
Exterior Wall (Between Existing and New Walls)	Silicone coated, polyurethane foam "rods"	Fluted face	WABO (BASF Watson Bowman Acme)	To be selected by Architect

## 2.4 DIVISION 08 - OPENINGS

## A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

1. See under 09 91 00, PAINT AND COATINGS in this section for paint.

## B. SECTION 08 14 00, WOOD DOORS

1. See under 09 91 00, PAINT AND COATINGS in this section for paint and stain.

C. SECTION 8 16 13, FIBERGLASS REINFORCED PLASTIC DOORS

Component	Finish	Color
Doors	Smooth	Match color of metal doors
Frames	Smooth	Match color of metal door frames

D. SECTION 08 31 13, ACCESS DOORS AND FRAMES

1. Paint to match surround walls or ceiling, unless noted otherwise.

E. SECTION 08 36 13, SECTIONAL DOORS

Material	Finish	Manufacturer	Color
Galv. Steel	Smooth		Match color of metal doors and frames

F. SECTION 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Material	Finish	Manufacturer	Mfg. Color
Aluminum	Clear anodized		
Glass at Reception	---	---	See Section 06 64 19, DECORATIVE TRANSLUCENT PLASTIC PANELS
Glass at Exterior	IGU-1		

G. SECTION 08 42 29, AUTOMATIC BIFOLD ENTRANCE DOORS

Material	Finish	Manufacturer	Mfg. Color
Aluminum	Clear anodized		
Glass at Exterior	IGU-1		

H. SECTION 08 71 00, BUILDERS HARDWARE

1. See Section 08 71 00 for hardware finishes.

I. SECTION 08 80 00, GLAZING

Glazing Mark	Glazing Type	Manufacturer	Mfg. Color Name/No.
G-1	Float Glass		Clear
G-2	Clear Tempered		Clear
G-3	Safety Wire Glass		Clear

<b>IGU-1</b>	<b>Blast Resistant IGU</b>		<b>Clear/Low-E</b>
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## A. SECTION 08 90 00, LOUVERS

<b>Material</b>	<b>Finish</b>	<b>Manufacturer</b>	<b>Mfg. Color</b>
<b>Aluminum</b>	<b>PBVD (Kynar)</b>		<b>Match exterior door frames</b>

**2.5 DIVISION 09 - FINISHES**

## A. SECTION 09 24 00, PORTLAND CEMENT PLASTERING

1. Paint as noted under Section 09 91 00 in this Section.

## B. SECTION 09 29 00, GYPSUM BOARD.

1. Paint as noted under Section 09 91 00 in this Section.

## C. SECTION 09 30 13, CERAMIC TILING

<b>Mark</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
<b>CT-1</b>	<b>12 x 12 Unglazed porcelain</b>	<b>American Olean</b>	<b>Highland Ridge# HR52 Evergreen</b>
<b>CT-2</b>	<b>6 x 6 Unglazed porcelain</b>	<b>American Olean</b>	<b>Highland Ridge #HR50 Desert</b>
<b>CT-3</b>	<b>6 x 6 Unglazed porcelain</b>	<b>American Olean</b>	<b>Highland Ridge #HR52 Evergreen</b>

## D. SECTION 09 51 00, ACOUSTICAL CEILINGS

<b>Mark</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
<b>ACT</b>	<b>2'x2' Tegular</b>	<b>Armstrong</b>	<b>Cirrus, Open Plan</b>
<b>ACT-M</b>	<b>2'x2' Wood veneer tegular</b>	<b>USG</b>	<b>True Wood (install in channeled grid)</b>
<b>ACT-W</b>	<b>2'x2' Square</b>	<b>Armstrong</b>	<b>Clean Room VL</b>

## E. SECTION 09 65 13, RESILIENT BASE AND ACCESSORIES

<b>Mark</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
<b>RB</b>	<b>Rubber Base – 6"</b>	<b>Johnsonite</b>	<b>#49 Beige</b>
<b>TS</b>	<b>Vinyl Transition Strip</b>	<b>Johnsonite</b>	<b>#49 Beige</b>

## F. SECTION 09 65 16, RESILIENT SHEET FLOORING

<b>Mark</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
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<b>RS-1</b>	<b>Sheet Vinyl</b>	<b>Techdesign- Silver Knight</b>	<b>Light Cherry #TD-SKW-4085</b>
<b>RS-2</b>	<b>Sheet Vinyl</b>	<b>Techdesign- Silver Knight</b>	<b>Natural #TD-SKW-4518</b>
<b>RS-11</b>	<b>Sheet Vinyl</b>	<b>Technoflor</b>	<b>Dark Cherry #31116</b>
<b>RS-12</b>	<b>Sheet Vinyl</b>	<b>Technoflor</b>	<b>Beechnut #52209</b>

## G. SECTION 09 67 25, RESINOUS FLOORING

<b>Mark</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
<b>EF-1</b>	<b>Trowelable Epoxy Flooring</b>		<b>TBD</b>

## H. SECTION 09 68 00, CARPETING

<b>Mark</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Mfg. Color Name/No.</b>
<b>CPT-1</b>	<b>50 cm x 50 cm tile</b>	<b>Miliken</b>	<b>Remix-Freestyle #0024048</b>
<b>CPT-2</b>	<b>18"x18" tile (walk-off)</b>	<b>Mannington</b>	<b>Ruffian, Color Shale</b>

## I. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards		Gloss @60	Sheen @85
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	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	

## PAINT

<b>Code</b>	<b>Use</b>	<b>Type</b>	<b>Gloss</b>	<b>Manufacturer</b>	<b>Name/No.</b>
<b>P-1</b>	<b>Gyp Board</b>	<b>Polyurethane – fortified Acrylic</b>	<b>Level 3</b>	<b>Scrub Tough by Scuffmaster</b>	<b>Match SW6106 Kilim Beige</b>
<b>P-2</b>	<b>Gyp Board</b>	<b>Acrylic Latex</b>	<b>Level 3</b>	<b>Sherwin Williams</b>	<b>White to match ceiling tile</b>
<b>P-3</b>	<b>Gyp Board</b>	<b>Acrylic Latex</b>	<b>Level 3</b>	<b>Sherwin Williams</b>	<b>SW6106 Kilim Beige</b>
<b>P-4</b>	<b>HM Doors and Frames (Interior)</b>	<b>100% Acrylic Latex</b>	<b>Level 5</b>	<b>Sherwin Williams</b>	<b>SW6108 Latte</b>
<b>P-5</b>	<b>Concrete &amp; Portland Plaster</b>	<b>Acrylic Latex</b>	<b>Level 3</b>	<b>Sherwin Williams</b>	<b>White to match ceiling tile</b>
<b>P-6</b>	<b>CMU &amp; Conc.</b>	<b>Acrylic Latex</b>	<b>Level 3</b>	<b>Sherwin Williams</b>	<b>SW6106 Kilim Beige</b>

**STAIN**

<b>Code (S)</b>		<b>Transparency</b>		<b>Manufacturer</b>	<b>Name/No.</b>
<b>S-1</b>	<b>Wood Doors.</b>	<b>Semi-Transp,</b>	<b>---</b>		<b>Match exist.</b>

**CLEAR COATINGS**

<b>Code(CC)</b>		<b>Type</b>	<b>Gloss</b>	<b>Manufacturer</b>	<b>Name/No.</b>
<b>CC-1</b>	<b>Wood Doors</b>	<b>Clear Polyurethane</b>	<b>Level 5</b>		

**J. SECTION 09 96 59, HIGH-BUILD GLAZED COATINGS**

<b>Code</b>	<b>Use</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Name/No.</b>
<b>HP-1</b>	<b>Exterior Exposed Metal</b>	<b>Epoxy Urethane System</b>		
<b>HP-2</b>	<b>Walls and Ceiling of Decon Shower</b>	<b>Chemical Resistant Epoxy Wall Coating</b>		

**2.6 DIVISION 10 - SPECIALTIES****A. SECTION 10 26 00, WALL AND DOOR PROTECTION**

<b>Component/ Mark</b>	<b>Material</b>	<b>Design Basis:</b>	<b>Finish/Color</b>
<b>Corner Guards</b>	<b>PETG plastic</b>		
<b>CG-1</b>		<b>SM20 by c-s group</b>	<b>#372 Classic Maple</b>
<b>CG-2</b>		<b>SM20 by c-s group</b>	<b>#513 Khaki Brown</b>
<b>Hand Rails</b>	<b>PETG Plastic</b>		
<b>HR-1</b>		<b>HRB-10CN by c-s group</b>	<b>Top Rail: #372 Classic Maple Body: #513Khaki Brown</b>
<b>HR-2</b>		<b>HRB-10CN by c-s group</b>	<b>Top Rail: #513Khaki Brown Body: #513Khaki Brown</b>

**B. SECTION 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES**

1. See Section 10 28 00 for toilet accessories finishes.

**2.7 DIVISION 26 - ELECTRICAL****A. SECTION 26 51 00, INTERIOR LIGHTING**

1. See Schedule on Drawings.

**PART 3 - EXECUTION (NOT USED)**

--- END ---



**SECTION 09 22 16**  
**NON-STRUCTURAL METAL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

**1.2 RELATED WORK**

- A. Blocking: Section 0610 00, ROUGH CARPENTRY.
- B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- C. Gypsum board to be applied to framing: Section 09 29 00, GYPSUM BOARD.
- D. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS.

**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 interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Studs, runners and accessories.
  - 2. Channels (Rolled steel).
  - 3. Furring channels.
  - 4. Screws, clips and other fasteners.
- C. Shop Drawings:
  - 1. Typical condition where studs are suspended from above.
  - 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 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**

- A. 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)

A123-02 .....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy  
Coated (Galvannealed) by the Hot-Dip Process

A641-03 .....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-07 .....Terminology Relating to Gypsum and Related Building  
Materials and Systems

C645-07 .....Non-Structural Steel Framing Members

C754-04 .....Installation of Steel Framing Members to Receive  
Screw-Attached Gypsum Panel Products

C841-03 .....Installation of Interior Lathing and Furring

C954-04 .....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

C1002-04 .....Steel Self-Piercing Tapping Screws for the Application of  
Gypsum Panel Products or Metal Plaster Bases to Wood Studs  
or Steel Studs

## **PART 2 - PRODUCTS**

### **2.1 PROTECTIVE COATING**

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

### **2.2 STEEL STUDS AND RUNNERS (TRACK)**

- A. ASTM C645, modified for thickness specified and sizes and shown.

1. Use ASTM A525 steel, 0.9 mm (0.0359-inch) (20 gauge) thick bare metal, except as noted otherwise.
  2. Use ASTM A525 steel, 1.8 mm (0.0712 inch) (18 gage) thick bare metal, for walls over 3.66 m (12 feet) tall, as noted on the Drawings.
  3. Runners same thickness as studs.
  4. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi (275 MPa) minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754. Manufacturer must show that the studs perform at the same level as undimpled studs of the same thickness.
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.
- E. Shaft Wall Framing:
1. Conform to rated wall construction.
  2. C-H Studs.
  3. E Studs.
  4. J Runners.
  5. Steel Jamb-Strut.

## **2.3 FURRING CHANNELS**

- A. Rigid furring channels (hat shape): ASTM C645.
- B. "Z" Furring Channels:
1. Not less than 0.45 mm (0.0179-inch)-thick galvanized steel, with 32 mm (1-1/4 inch) flanges.
  2. Web furring depth to suit thickness of insulation with slotted perforations.

## **2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES**

- A. Conform to ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.
- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.
- F. Tie Wire and Hanger Wire:
  - 1. ASTM A641, soft temper, Class 1 coating.
  - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- G. Attachments for Wall Furring:
  - 1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.

### **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 406 mm (16 inches) on center, except where noted otherwise.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions.
- F. Provide continuous horizontal bracing at one-third points of the height of each wall. Bracing to be not less than 3/4 inch channels. Coordinate with similar bracing at openings.
- G. Openings:
  - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.

2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
4. At all wall opening provide not less than 3/4 inch channels at not less than 6 inches and not more than 12 inches above and below each opening. Channels must be anchored to each stud that they cross and extend not less than 32 inches beyond the opening on each side and end on a stud.

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. Where studs meet structure above, provide anchorage that permits structure to deflect without damaging studs or sheathing materials.

I. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

### **3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY**

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Direct attachment to masonry or concrete; rigid channels:
  1. Install rigid (hat section) furring channels at 600 mm (24 inches) on center or vertically.
  2. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
  3. Fasten furring channels to walls with drilled expansion anchors or self tapping anchors. Do not use power driven anchors. Where channels are spliced, provide two fasteners in each flange.
  4. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions.

### **3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES**

- A. Provide for attachment and support of electrical outlets, plumbing, or heating fixtures, access panel frames, wall bumpers, s, 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.

- C. Where wood blocking is used, conform to Section 06 10 00, ROUGH CARPENTRY. All wood blocking to be fire retardant treated.

### **3.5 INSTALLING SHAFT WALL SYSTEM**

- A. Conform to UL Design No. U438 for two-hour fire rating.
- B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.
- C. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.
- D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.
- E. Suitably frame all openings to maintain structural support for wall:
  - 1. Provide necessary liner fillers and shims to conform to label frame requirements.
  - 2. Frame openings cut within a liner panel with E studs around perimeter.
  - 3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

### **3.6 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS**

- A. Install suspended soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified.
- B. Existing concrete construction exposed or concrete on steel decking:
  - 1. Use expansion anchors, epoxy anchors or self tapping anchors for type of hanger attachment required.
  - 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.
- C. Installing suspended soffits:
  - 1. Space studs at no more than 400 mm (16-inch) centers.
  - 2. Provide approximately 45 degree angle brace at not more than 1.22 m (4'-0") on center and at each end that is not anchored to a fixed wall. Anchor brace to vertical studs at no more than 6 inches above the bottom runner. Provide an additional runner turned sideways and anchored to each stud located just above the crotch where the brace meets the studs. Anchor top of brace to floor structure above.

**3.7 TOLERANCES**

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- C. Level or align ceilings within 3 mm (1/8-inch.)

- - - END - - -



**SECTION 09 24 00**  
**PORTLAND CEMENT PLASTERING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies lathing and Portland cement based plaster.

**1.2 RELATED WORK**

- A. Steel framing members for attachment of plaster bases: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Room finish schedule and color: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 TERMINOLOGY**

- A. Definitions and description of terms shall be in accordance with ASTM C11, C841, and C926 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, and bar joists.
- C. Self-furring Lath: Metal plastering bases having dimples or crimps designed to hold the plane of the back of the lath 6 to 10 mm (1/4 to 3/8 inch) away from the plane of the solid backing.
- D. Solid Backing or Solid Bases: Concrete, masonry, sheathing, rigid insulation, and similar materials to which plaster is directly applied.
- E. Wet Areas: Areas of a building where cyclic or continuous exposure to very humid or wet conditions, or in which a dew point condition may occur in the plaster. Dew point conditions occur frequently in such areas as laundries, natatoriums, cart and dish washing spaces, hydrotherapy, kitchens, bathing or shower rooms and similar areas.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Accessories for plaster, each type.
  2. Backer board for plastering, each type.
  3. Fasteners.
  4. Bonding compounds, including application instructions.
  5. Admixtures, including mixing and application instructions.
- C. Samples:

1. Accessories for plaster, each type, not less than 150 mm (6 inches) long.
- D. Mix: Provide description of mix to be used for plastering.
- E. Mock-Up
  1. Prepare one of the one shower stall for review.
  2. Do not proceed until the first stall is approved.

## **1.5 PROJECT CONDITIONS**

- A. Maintain work areas for interior work at a temperature of not less than 4°C (40°F) for not less than 48 hours prior to application of plaster, during application of plaster and until plaster is completely dry.
- B. Exterior plaster shall not be applied when the ambient temperature is less than 4°C (40°F).
- C. Plaster shall not be applied to frozen surfaces or surfaces containing frost.
- D. Frozen materials shall not be used in the mix.
- E. Plaster coats shall be protected against freezing for a period of not less than 24 hours after application.

## **1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing And Materials (ASTM):
  - A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - C11-07 .....Terminology Relating to Gypsum and Related Building Materials and Systems.
  - C150-07 .....Portland Cement
  - C207-06 .....Hydrated Lime for Masonry Purposes
  - C841-03 .....Installation of Interior Lathing and Furring
  - C847-06 .....Metal Lath
  - C897-05 .....Aggregate for Job-Mixed Portland Cement Based Plasters
  - C926-06 .....Application of Portland Cement-Based Plaster
  - C1002-07 .....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  - C1325-08 .....Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

## D. Portland Cement Association

PCPM.....Portland Cement Plaster Manual.

**PART 2 - PRODUCTS****2.1 PORTLAND CEMENT PLASTERING BASE**

## A. Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Board:

1. Conform to ASTM 1325, including all supplementary requirements.
2. One face must be textured to bond well to mortar or plaster.

**2.2 ACCESSORIES FOR CEMENT PLASTER**

## A. ASTM C841, except fabricate from zinc alloy.

## B. Control Joints: ASTM C841, zinc.

## C. Expanded metal lath.

1. ASTM C847, zinc-coated (galvanized) except as modified by ASTM C841 and this specification. Self furring where applied over solid backing.
2. Flat diamond mesh weighing not less than 1.8 kg/m<sup>2</sup> (3.4 pounds per square yard).

**2.3 FASTENERS**

## A. Non-corroding of type recommended by the manufacturer of the cementitious backer board for ceiling plastering application.

**2.4 CEMENT**

## A. Portland: ASTM C150, Type I.

## B. Masonry Cement: ASTM C91.

## C. White where required for white finish coat.

**2.5 LIME**

## A. ASTM C206, Type S.

## B. ASTM C207, Type S.

**2.6 AGGREGATES (SAND)**

## A. ASTM C897, graded as required to suit texture of finish specified.

## B. White where white finish coat is specified.

**2.7 BONDING AGENT**

## A. ASTM C932.

**2.8 MIXES**

## A. ASTM C926, mix F

## B. If two coat system is used, the first coat may be ASTM C926, mix C; finish coat, mix F.

## C. Other mixes will be considers upon request to the Architect/Engineer.

**PART 3 - EXECUTION****3.1 INSTALLING METAL PLASTERING BASES**

- A. On ceiling or soffit framing use flat diamond mesh lath.
- B. In accordance with ASTM C841, except as otherwise specified or shown.
- C. Form true surfaces, straight or in fair curves where shown, without sags or buckles and with long dimension of lath at right angles to direction of supports.
- D. Lath for ceiling or soffit construction shall terminate at casing bead (floating angle construction) at perimeter angles between walls and ceilings or soffits.
- E. Lath with backing shall be applied to produce a paper to paper and metal to metal lap at ends and sides of adjacent sheets, whether full sheets or less than full sheets are used:
  - 1. Backing shall be lapped 50 mm (2 inches) for both horizontal and vertical laps.
  - 2. Horizontal laps shall be ship lap fashion to conduct water to the outside and over flashing or waterproofing.
- F. Metal plastering bases shall not be continuous through expansion and control joints, but shall be stopped at each side.

**3.2 INSTALLING CEMENTITIOUS BACKER BOARD**

- A. Conform to manufacturer's recommendations for board used for ceilings to be plastered with cement plaster.
- B. Provide minimum 76 mm (3 inch) wide strip lath at all joints in backer board which are not expansion joints. Lap each board not less than 32 mm (1¼ inch).

**3.3 INSTALLING PLASTERING ACCESSORIES**

- A. Install accessories in accordance with ASTM C841, except as otherwise specified.
  - 1. Set plastering accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified for metal lath.
  - 2. Install in one piece, within the limits of the longest commercially available lengths.
- B. Corner Beads: Install at all vertical and horizontal external plaster corners, as required to establish grounds, and where shown.
- C. Strip Lath:
  - 1. Install metal lath strips centered over joints between dissimilar materials, such as hollow tile, brick, concrete masonry units, concrete, and joints with metal lath on framing or furring, where both such surfaces are required to be plastered and are in contact with each other in same plane, except where expansion joints and casing beads are required.

2. Wire tie or fasten strip lath to base along both edges at not over 150 mm (six inches) on centers.

D. Casing Beads:

1. Install casing beads where shown and at following locations where plaster terminates to provide finish trim.
2. Where plaster terminates against non-plastered surfaces such as masonry, concrete, wood, gypsum board or ceramic tile.
3. Where plaster terminates against trim of steel frames and trim of other materials and equipment, except where trim overlaps plaster.
4. Around perimeter of openings except where edge is covered by flanges. Locate to conform to dimensions shown on shop drawings.
5. Where plaster for new walls or furring (vertical or horizontal) terminates against existing construction.
6. Both sides of expansion and control joints unless shown otherwise.
7. Install casing bead at perimeter angles between walls and ceilings so as to provide floating angle (unrestrained) construction in accordance with ASTM C841.

E. Cornerites:

1. Install at interior corners of walls, partitions, and other vertical surfaces to be plastered, except where metal lath is carried around angle.
2. Fasten only as necessary to retain position during plastering.
3. Omit cornerites at junction of new plastered walls with existing plastered walls at locations where casing beads are specified.

F. Control Joints:

1. Where control joints does not run perpendicular to the framing members, provide additional blocking as necessary so the control joint is fully backed, anchored and supported at not more than 400 mm (16 inches) on center.
2. Install control joints only to the edges of abutting sheets of backer board so that the board is not continuous or tied across the joint.
3. Joints shall extend the full width and height of the wall or length of soffit/ceiling plaster membrane.

### **3.4 SURFACE PREPARATION OF SOLID BASES**

- A. Surfaces that are to receive plaster shall be prepared and conditioned in accordance with ASTM C926, except as otherwise specified.

**3.5 PORTLAND CEMENT BASED PLASTER**

- A. Depending up on the roughness of the surface of the cementitious backer board, provide one coat or two coat application.
- B. Conform to ASTM C926 and PCPM.
- C. Finish coat shall be sand float.

--- E N D ---

**SECTION 09 29 00  
GYPSUM BOARD**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies installation and finishing of gypsum board.

**1.2 RELATED WORK**

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Tile backer board: Section 09 30 13, CERAMIC TILING.

**1.3 TERMINOLOGY**

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. "Wet Areas": Areas of a building where cyclic or continuous exposure to very humid or wet conditions, or in which a dew point condition may occur in the plaster. Dew point conditions occur frequently in such areas as laundries, natatoriums, car and dish washing spaces, hydrotherapy, kitchens, bathing or shower rooms and similar areas.
- 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 and expansion joints.
  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 fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.
  3. Typical shaft wall assembly.
  4. Typical smoke rated assembly.
- D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

1. Fire rating test, each fire rating required for each assembly.

## **1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

- A. In accordance with the requirements of ASTM C840.

## **1.6 ENVIRONMENTAL CONDITIONS**

- A. In accordance with the requirements of ASTM C840.

## **1.7 APPLICABLE PUBLICATIONS**

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

B. American Society For Testing And Materials (ASTM):

C11-04 ..... Terminology Relating to Gypsum and Related Building  
Materials and Systems

C473-07 ..... Standard Test Methods for Physical Testing of Gypsum Panel  
Products.

C475-02 ..... Joint Compound and Joint Tape for Finishing Gypsum Board

C840-04 ..... Application and Finishing of Gypsum Board

C954-04 ..... 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

C1002-04 ..... Steel Self-Piercing Tapping Screws for the Application of  
Gypsum Panel Products or Metal Plaster Bases to Wood Studs  
or Steel Studs

C1047-04 ..... Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177-04 ..... Glass Mat Gypsum Substrate for Use as Sheathing

C1396-04 ..... Gypsum Board

D3273 ..... Standard Test Method for Resistance to Growth of Mold on the  
Surface of Interior Coatings in an Environmental Chamber.

E84-04..... Surface Burning Characteristics of Building Materials

E497-99..... Installing Sound Isolating Lightweight Partitions

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Intertek Testing Services (ITS):

Latest Editions .....Certification Listings

## **PART 2 - PRODUCTS**

### **2.1 METAL FRAMING MATERIALS**

A. See Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

### **2.2 GYPSUM BOARD**

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise.

B. Coreboard or Shaft Wall Liner Panels.

1. ASTM C1396, Type X.

2. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.

C. Mold and Moisture Resistant Gypsum Board: Type X, 16 mm (5/8 inch) thick.

1. ASTM C473: Not greater than 5 percent average water absorption for panels by weight after two-hour immersion.

2. ASTM D3273: Score 10.

### **2.3 ACCESSORIES**

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet.

B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

### **2.4 FASTENERS**

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. For fire rated construction, type and size same as used in fire rating test.

E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

### **2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE**

A. ASTM C475 and ASTM C840.

B. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.

1. Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.

2. Joint Compound: Tape to be set and holes over 1/4 inch in smallest dimension to be filled with chemical setting type compound. Successive coats may be with ready-mixed or chemical setting type compound, as recommended by the gypsum board manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 FRAMING INSTALLATION**

- A. See Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

#### **3.2 GYPSUM BOARD HEIGHTS**

- A. Extend all layers of gypsum board from floor to underside of structure overhead unless noted otherwise.
- B. Where gypsum board is shown to terminate above the ceiling, terminate not less than 100 mm (4 inches) above suspended acoustical ceilings.

#### **3.3 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. For all "wet areas" use mold and moisture resistant gypsum board.
- 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. Walls (Except Shaft Walls):
  1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
  2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
  3. Stagger screws on abutting edges or ends.
  4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints.
  5. Control Joints ASTM C840 and as follows:
    - a. Provide control joints where shown on Drawings. Provide control joints at maximum 30 feet on center and at all building control/expansion joints whether specifically shown on Drawing or not.
    - b. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
    - c. Not required for wall lengths less than 9000 mm (30 feet).
    - d. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

G. 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, within 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.

### **3.4 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 indicated.
- C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
  1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
  2. Stagger joints top and bottom in adjacent panels.
- D. Install according to UL design and manufacturers recommendations
- E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

### **3.5 FINISHING OF GYPSUM BOARD**

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use level 4 for all finished areas in this Project.
- B. Before proceeding with installation of finishing materials, assure the following:
  1. Gypsum board is fastened and held close to framing or furring.
  2. Fastener 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, and fire rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, and fire rated construction. Sanding is not required on non-decorated surfaces.

### **3.6 REPAIRS**

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non-decorated surface to provide smoke tight construction and fire protection equivalent to the fire rated construction.

- - - E N D - - -

**SECTION 09 30 13  
CERAMIC TILING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies ceramic tile, marble thresholds, backer board for mounting tile, mortar, grout and accessories for tiling.

**1.2 RELATED WORK**

- A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.
- B. Color, texture and pattern of field tile and trim shapes, size of field tile, and color of grout specified: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Resilient edge strips at joints with other flooring materials: 09 65 13, RESILIENT BASE AND ACCESSORIES.
- D. Related finishes in showers: 10 21 16, SHOWER COMPARTMENTS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Tile, each type, color, and size.
- C. Product Data:
  - 1. Ceramic tile, marked to show each type, size, and shape required.
  - 2. Marble threshold.
  - 3. Coated Glass Mat Water-Resistant Gypsum Backing Panel
  - 4. Reinforcing tape.
  - 5. Leveling compound.
  - 6. Latex-Portland cement mortar and grout.
  - 7. Chemical resistant mortar and grout (Epoxy and Furan)
  - 8. Precast Shower Receptor
- D. Certification:
  - 1. Master grade for tile, ANSI A137.1.
  - 2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
    - a. Cementitious backer unit.
    - b. Coated Glass Mat Water-Resistant Gypsum Backing Panel

- c. Reinforcing tape.
- d. Latex-Portland cement mortar and grout.
- e. Chemical resistant mortar and grout (Epoxy and Furan)
- f. Leveling compound.
- g. Organic adhesive.
- h. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.

#### **1.4 DELIVERY AND STORAGE**

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced.

Publications are referenced in text by basic designation only.

- B. American National Standards Institute (ANSI):

A10.20-05 .....Safety Requirements for Ceramic Tile, Terrazzo, and Marble Works

A108.6-05 .....Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy

A108.10-05 .....Installation of Grout in Tilework

A118.3-05 .....Chemical Resistant, Water Cleanable Tile-Setting Epoxy and Water Cleanable Tile-Setting and Grouting Epoxy Adhesive

A118.4-05 .....Latex-Portland Cement Mortar

A118.6-05 .....Standard Cement Grouts for Tile Installation

A118.10-05 .....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation

A137.1-88 .....Ceramic Tile

- C. American Society For Testing And Materials (ASTM):

C109/C109M-07 .....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)

C241-90 (R2005) .....Abrasion Resistance of Stone Subjected to Foot Traffic

C348-02 .....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars

- C627-93(R2007) .....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
- C1027-99(R2004) .....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
- C1178/C1178M-06 .....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
- C1325-08 .....Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
- D. 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 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 for wet and dry conditions.
  4. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
  5. Factory-Applied Temporary Protective Coating:
    - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
    - b. Do not coat unexposed tile surfaces.
    - c. Pre-wax tiles set or grouted with latex modified mortars.
- B. Unglazed Ceramic Floor Tile:

1. Type: Color body with printed surface.
2. Nominal 6 mm (1/4 inch) thick with cushion edges.
3. Size:
  - a. Floor: 305 x 305 mm (12 x 12 inches)
  - b. Walls: 152 x 152 mm (6 x 6 inches).

C. Trim Shapes:

1. Conform to applicable requirements of adjoining floor and wall tile.
2. Internal and External Corners:
  - a. Square internal and external corner joints are not acceptable.
  - b. External corners including all exposed edges: Use bullnose shapes.
  - c. Internal corners: Use cove shapes.
  - d. Base to floor internal corners (including at floor): Use special shapes providing integral cove vertical and horizontal joint.
    - 1) Base to match wall tile.
  - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
  - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
  - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
  - h. For unglazed ceramic mosaic and glazed wall tile installed in latex-Portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.

## **2.2 BACKER BOARD**

1. Cementitious Backer Board:
  - a. Conforming to ASTM C1325 and ANSI A118.9.
  - b. Use at walls and ceilings of shower area.

## **2.3 JOINT MATERIALS FOR BACKER UNITS**

- A. As recommended by backer board manufacturer for specific application.

## **2.4 FASTENERS**

- A. As recommended by backer board manufacturer for specific application.

## **2.5 SETTING MATERIALS OR BOND COATS**

- A. Conform to TCA Handbook for Ceramic Tile Installation.
- B. Latex-Portland Cement Mortar: ANSI A118.4.
  - 1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A118.4.
  - 2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

## **2.6 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. Color: To be selected by Architect from manufacturer's standard colors.
- B. Latex-Portland Cement Grout: ANSI A118.6 color as specified.
  - 1. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

## **2.7 PATCHING AND LEVELING COMPOUND**

- A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Shall have minimum following physical properties:
  - 1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
  - 2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
- C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.
- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

## **2.8 MARBLE**

- A. Soundness Classification in accordance with MIA Design Manual III Groups.
- B. Thresholds:
  - 1. Group A, Minimum abrasive hardness (Ha) of 10.0 per ASTM C241.
  - 2. Honed finish on exposed faces.

3. Fabricate from one piece without holes, cracks, or open seams; full depth of wall or frame opening by full width of wall or frame opening; 19 mm (3/4-inch) minimum thickness and 6 mm (1/4-inch) minimum thickness at beveled edge.
4. Set not more than 13 mm (1/2-inch) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2. On existing floor slabs provide 13 mm (1/2-inch) above ceramic tile surface with bevel edge joint top flush with adjacent floor.
5. One piece full width of door opening. Notch thresholds to match profile of door jambs.

## **2.9 WATER**

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

## **2.10 CLEANING COMPOUNDS**

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic material not acceptable.

## **PART 3 - EXECUTION**

### **3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

### **3.2 EXAMINATION**

- A. Verify existing tile type and bedding and grouting.

### **3.3 ALLOWABLE TOLERANCE**

- A. Match and align with existing tile at all edges of patch areas where patch meets existing.
- B. Where larger areas of patch are involved and where it does not violate the requirement to match existing, conform to the following:

1. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
  - a. Not more than 1 in 500 (1/4 inch in 10 feet) from required elevation where Portland cement mortar setting bed is used.
  - b. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
2. Variation in Plane of Wall Surfaces:
  - a. Not more than 1 in 400 (1/4 inch in eight feet) from required plane where Portland cement mortar setting bed is used.
  - b. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

### **3.4 SURFACE PREPARATION**

#### **A. Cleaning Existing or New Concrete:**

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 substrates that are out of required plane.
4. Adjust as necessary to match the plane of existing surfaces.

### **3.5 CEMENTITIOUS BACKER UNITS**

- A. Remove polyethylene wrapping from cementitious backer units and separate to allow for air circulation. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.
- B. Install in accordance with ANSI A108.11 except as specified otherwise.
- C. Install units horizontally or vertically to minimize joints with end joints over framing members. Units with rounded edges; face rounded edge away from studs to form a V joint for joint treatment.
- D. Secure cementitious backer units to each framing member with screws spaced not more than 200 mm (eight inches) on center and not closer than 13 mm (1/2 inch) from the edge of the backer unit or as recommended by backer unit manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.
- E. Where backer unit joins shower pans or waterproofing, lap backer unit over turned up waterproof system. Install fasteners only through top one-inch of turned up waterproof systems.
- F. Do not install joint treatment for seven days after installation of cementitious backer unit.
- G. Joint Treatment:
  - 1. Fill horizontal and vertical joints and corners with latex-Portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.
  - 2. Leave 6 mm (1/4 inch) space for sealant at lips of tubs, sinks, or other plumbing receptors.

### **3.6 MARBLE**

- A. Secure thresholds and stools in position with minimum of two stainless steel dowels.
- B. Set in dry-set Portland cement mortar or latex-Portland cement mortar bond coat.
- C. Set threshold to finish 12mm (1/2 inch) above ceramic tile floor unless shown otherwise, with bevel edge joint top flush with adjacent floor similar to TCA detail TR611-02.

### **3.7 CERAMIC TILE - GENERAL**

- A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.
- B. Comply with TCA Installation Guidelines
- C. Setting Beds or Bond Coats:

1. Floor: Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
  2. Wall: Over cementitious backer board substrates, install in accordance with TCA Handbook Method W244C, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
  3. Set trim shapes in same material specified for setting adjoining tile.
- D. Workmanship:
1. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
  2. Form intersections and returns accurately.
  3. Cut and drill tile neatly without marring surface.
  4. 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.
  5. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
  6. Remove and reset tiles that are out of plane or misaligned.
  7. 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 200 mm (8 inches) square to achieve full support of bond coat.
  8. Joints:
    - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
    - b. Match existing joints.

**3.8 GROUTING**

- A. Latex-Modified Portland Cement grout: ANSI A108.10.

**3.9 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 as recommended by the manufacturer of the grout and bond coat.

**3.10 PROTECTION**

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

--- END ---

## **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 SUBMITTAL**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Acoustical units, each type, with label indicating conformance to specification requirements.
  - 2. Colored markers for units providing access.
- C. Manufacturer's Literature and Data:
  - 1. Ceiling suspension system, each type, showing complete details of installation.
  - 2. Acoustical units, each type
- D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

#### **1.3 MAINTENANCE SUBMITTALS**

- A. Provide ten (10) percent additional ceiling tiles for Owner's future use.
- B. Provide on complete boxes or packages, in original sealed, conditions with label clearing indicating contents, type and style.
- C. Deliver to Owner at location to be verified with the Resident Engineer.

#### **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-98.....Zinc-coated (Galvanized) Carbon Steel Wire
  - A653/A653M-01.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

C423-01 .....	Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
C634-01 .....	Standard Terminology Relating to Environmental Acoustics
C635-00 .....	Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
C636-96 .....	Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
D3273 -05 .....	Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
E84-01.....	Surface Burning Characteristics of Building Materials
E119-00.....	Fire Tests of Building Construction and Materials
E413-87 (R1999) .....	Classification for Rating Sound Insulation.
E1264-98.....	Classification for Acoustical Ceiling Products

## **PART 2 - PRODUCTS**

### **2.1 METAL SUSPENSION SYSTEM**

- A. ASTM C635, heavy-duty system, except as otherwise specified.
  - 1. Ceiling suspension system members may be fabricated from either of the following unless specified otherwise.
    - a. Galvanized cold-rolled steel, bonderized.
    - b. Extruded aluminum.
  - 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 22 mm (7/8 inch) with not less than 8 mm (5/16 inch) panel bearing surface.
  - 2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members.
  - 3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units.
- C. Special Channeled Grid Suspension System:
  - 1. Exposed Channel grid with an open slot exposed downward.
  - 2. Channel Width: 14 mm (9/16 inch.)
  - 3. Slot width: 6 mm (1/4 inch)

4. Provide a system similar to Fineline DXF/DXLF by USG.

## 2.2 WIRE

- A. ASTM A641.
- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

## 2.3 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).

## 2.4 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 mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

## 2.5 ACOUSTICAL UNITS

- A. Acoustical Unit ACT: Mineral fiber panels conforming to the following:
  1. ASTM E1264, Type III Units –Mineral fiber, Form 1 – Nodular, wet formed, minimum 22 mm (7/8 inch) thick weighing 6.84 kg/m<sup>2</sup> (1.4 psf) minimum.
  2. Class A Flame Spread: ASTM 84
  3. Minimum NRC (Noise Reduction Coefficient): 0.75 unless specified otherwise: ASTM C423.
  4. Minimum CAC (Ceiling Attenuation Class): 35 range unless specified otherwise: ASTM E413.
  5. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.85 on the exposed surfaces, except as specified otherwise in Section.
  6. Lay-in panels: Sizes as shown, with tegular edges.
  7. Pattern: E I C
  8. Mold/Mildew: No Growth per ASTM D 3273

B. Acoustical Unit ACT-W: Vinyl faced mineral core lay-in panels conforming to the following:

1. ASTM E1264, Type IV Units – Mineral fiber, Form 2 – Water felted, scrubbable vinyl finish, slightly textured surface, minimum 13 mm (1/2 inch) thick, non-perforated
2. Weight: 9.76 kg/m<sup>2</sup> (2.0 psf) tile.
3. Class A Flame Spread: ASTM 84
4. Vinyl Coated including edges sealed.
5. Light Reflectance (LR) coefficient of not less than 0.78 on the exposed surfaces.
6. Lay-in panels: Sizes as shown, with square edges.
7. Pattern: E
8. Mold/Mildew: No Growth per ASTM D 3273

C. Acoustical Units ACT-M: Wood veneer faced composite panels

1. Fire Performance: ASTM E1264, Class A.
2. Size: 609 x 609 x 19 mm (24 x 24 x 3/4 inches).
3. Edge: Tegular.
4. Provide a panel system similar to True Wood by USG.

## 2.6 ACCESSORIES:

- A. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inch (610 mm) on center on all cross tees.

## 2.7 ACCESS IDENTIFICATION

A. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.

B. Use markers of the same diameter throughout building.

C. Color Code: Use following color markers for service identification:

Color .....	Service
Red .....	Sprinkler System: Valves and Controls
Green.....	Domestic Water: Valves and Controls
Yellow.....	Chilled Water and Heating Water
Orange.....	Ductwork: Fire Dampers
Blue.....	Ductwork: Dampers and Controls
Black .....	Gas: Laboratory, Medical, Air and Vacuum

**PART 3 - EXECUTION****3.1 CEILING TREATMENT**

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown.
- 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 1.48 m<sup>2</sup> (16 sf) of ceiling per hanger.
  - 4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
  - 5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
  - 6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
  - 7. Use main runners not less than 1200 mm (48 inches) in length.
  - 8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Anchorage to Structure:
  - 1. Concrete:
    - a. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger wire. Install in sides of concrete beams or joists at mid height.

2. Carriers:

- a. When piping, ductwork or other job conditions do 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 floor structure above as described herein for direct suspension, spaced not 1200 mm (4 feet) on center.

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, 1200 mm (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 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on 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. Treat edges as recommended by the manufacturer.
- B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
  1. Install tile to lay level and in full contact with exposed grid.
  2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.
- C. ACT-M to be installed in Special Channeled Grid suspension system.
- D. 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.

### **3.4 CLEAN-UP AND COMPLETION**

- A. Replace damaged, discolored, dirty, cracked and broken acoustical units.
- B. Leave finished work free from defects.

--- E N D ---



## **SECTION 09 65 13 RESILIENT BASE AND ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section specifies the installation of vinyl or rubber base.

#### **1.2 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Base material including manufacturer's recommendations for adhesives.
  - 3. Application and installation instructions.
  - 4. Adhesive: Literature indicating each type.
- C. Samples:
  - 1. Base: 150 mm (6 inches) long, each type and color.

#### **1.3 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.

#### **1.4 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.

#### **1.5 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):
  - F1861-02.....Resilient Wall Base

**PART 2 - PRODUCTS****2.1 GENERAL**

- A. Use only products by the same manufacturer and from the same production run.

**2.2 RESILIENT BASE**

- A. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 inches) high, Type TP Rubber, Thermoplastic, Group 1-solid with molded top. Style B-cove.
- B. Provide base in rolls. Four foot lengths are not acceptable.

**2.3 ACCESSORIES**

- A. Provide reducer strips, joint strips and edge strips for all changes in floor materials including from resilient to non-resilient and non-resilient to non-resilient flooring, unless noted otherwise.
- B. Reducers, joint and edge strips to be vinyl, unless noted otherwise.

**2.4 ADHESIVES**

- A. Use products recommended by the material manufacturer for the conditions of use.

**PART 3 - EXECUTION****3.1 PROJECT CONDITIONS**

- A. Maintain temperature of materials above 21° C (70 °F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21° C and 27° C (70°F and 80°F) for at least 48 hours, before, during, and after installation.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

**3.2 INSTALLATION REQUIREMENTS**

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Resident Engineer.
- B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.
- C. The Resident Engineer reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.

**3.3 PREPARATION**

- A. Examine surfaces on which material is to be installed.
- B. Fill cracks, pits, and dents with leveling compound.
- C. Do not use adhesive for leveling or filling.
- D. Clean substrate area of oil, grease, dust, paint, and deleterious substances.
- E. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.

- F. Verify the portion of wall to which the base will be glued is sound and fully support and will provide full backing for the base. Allow no more than 1/4 inch gap between the gypsum board or plaster and the floor.

### **3.4 BASE INSTALLATION**

- A. Location:
  - 1. As indicated on Drawings.
  - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
  - 1. Apply adhesive uniformly with no bare spots.
  - 2. Set base with joints aligned and butted to touch for entire height.
  - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
    - a. Short pieces to save material will not be permitted.
    - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
  - 1. Score back of outside corner.
  - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

### **3.5 ACCESSORY INSTALLATION**

- A. Provide reducer strips or edge strips at all transitions between flooring materials including from resilient to non-resilient and non-resilient to non-resilient flooring, unless noted otherwise.
- B. Install per manufacturer's recommendations.

### **3.7 CLEANING AND PROTECTION**

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.
- B. Clean and polish materials in the following order:
  - 1. After two weeks, scrub resilient base 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.
- C. Remove any protective materials immediately prior to acceptance and replace damaged materials and re-clean soiled resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

--- END ---



**SECTION 09 65 16**  
**RESILIENT SHEET FLOORING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This Section specifies the installation of sheet flooring with heat welded seams.

**1.2 RELATED WORK**

- A. Colors and Patterns: Section 09 06 00, FINISH SCHEDULE.
- B. Resilient base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

**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. Wear Resistance: 12,000 cycles, 500 g. load, S-33 (Taber Abrasion Test, when patterns worn out).
- D. Slip Resistance: Static Coefficient D-2047-93, in compliance with ADA requirements.
- E. 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, adhesive, 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.
2. 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.
3. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.

## **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 manufacturers recommendations for bond and moisture testing.
- C. Building shall be permanently enclosed. Schedule construction so that floor receives no construction traffic when completed.
- D. 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.

## **1.6 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 as recommended by the manufacturer.
- 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):
  - D2047-04 .....Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  - E648-06.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source.
  - E662-06.....Specific Optical Density of Smoke Generated by Solid Materials.
  - E1907-06.....Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings
  - F710-05.....Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
  - F1303-04.....Sheet Vinyl Floor Covering with Backing
- C. Resilient Floor Covering Institute (RFCI):
  - IP #1 .....Recommended Installation Practice for Homogeneous Sheet Flooring, Fully-Adhered
  - MRP .....Addressing Moisture Related Problems Relevant to Resilient Floor Coverings Installed Over Concrete (Nov 95)

## 1.8 GUARANTY:

- A. Submit written guaranty, in accordance with General Condition requirements.

## PART 2 - PRODUCTS

### 2.1 SHEET VINYL FLOOR COVERINGS

- A. General Sheet Vinyl Floor Covering:
  - 1. Sheet Vinyl Floor Coverings: Smooth face, minimum wear layer thickness nominal 0.51 mm (0.02 inch). Sheet flooring shall conform to ASTM F1303, Type I, Grade I.
    - a. Total Thickness: 2.00 mm (0.079 inches)
    - b. Foam-backed not acceptable.
  - 2. Size: Provide maximum size sheet vinyl material produced by manufacturer to provide minimum number of joints. Minimum size width acceptable - 1800 mm (72 inches).
  - 3. Each color and pattern of sheet flooring shall be of same production run.

**2.2 WELDING ROD:**

- A. Product of floor covering manufacturer in color shall match field color of sheet vinyl covering.

**2.3 ADHESIVES**

- A. Water resistant type recommended by the sheet flooring manufacturer for the conditions of use.

**2.4 LEVELING COMPOUND (FOR CONCRETE FLOORS)**

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.

**2.5 PRIMER (FOR CONCRETE SUBFLOORS)**

- A. As recommended by the adhesive or sheet flooring manufacturer.

**2.6 EDGE STRIPS**

- A. See Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

**2.7 SEALANT**

- A. As specified in Section 07 92 00, JOINT SEALANTS.
- B. Compatible with sheet flooring.

**PART 3 - EXECUTION****3.1 PROJECT CONDITIONS**

- A. Verify that moisture content of floor substrate is within the range indicated by the flooring and adhesive manufacturers. Provide documentation to the COTR before beginning installation showing that the required tests have been performed and that the results are within the acceptable range.
- B. Verify that temperature and humidity will be within the range recommended by the flooring and adhesive manufacturers during installation, curing and for the duration.
- C. Where integral base is scheduled, verify that the wall surface is sound and level and meets all recommendations of the flooring and adhesive manufacturers.

**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.

3. Verify that concrete sub-floor and self leveling underlayment surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity. Verify that the resulting emission rate and alkalinity meet the resilient flooring manufacturer's requirements. If no manufacturer's requirements are stated, verify that test results are within the following limits:
  - a. Moisture emission rate: Not greater than 3 lb per 1000 sq ft (7.1 kg per 100 sq m) per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
  - b. Alkalinity: pH range of 5-9.
  - c. Do not proceed with flooring application until the surface meets the stated requirements.
- 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. Preparation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives.

### **3.3 INSTALLATION OF FLOORING**

- A. Install work in strict compliance with RFCI IP#1 and manufacturer's instructions and approved layout drawings.
- B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams.
- C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.
- D. Match edges of resilient floor coverings for color shading and pattern at seams.
- E. Where resilient sheet flooring abuts other flooring material floors shall finish level.
- F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

- G. Inform the Resident Engineer of conflicts between this section and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.
- H. Install sheet in full coverage adhesives.
  - 1. Air pockets or loose edges will not be accepted.
  - 2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.
- I. Keep joints to a minimum; avoid small filler pieces or strips.
- J. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.
- K. Follow manufacturer's recommendations regarding pattern match, if applicable.
- L. Installation of Edge Strips:
  - 1. Locate edge strips under center lines of doors unless otherwise indicated.
  - 2. See in adhesive recommended by manufacturer.

### **3.4 WELDING**

- A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.
- B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.
- C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.
- D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

### **3.5 CLEANING**

- A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.
- B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.
- C. Clean and polish materials per flooring manufacturer's written recommendations.
- D. Vacuum floor thoroughly.
- E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer's recommendations.
- F. Upon completion, Resident Engineer shall inspect floor and base to ascertain that work was done in accordance with manufacturer's printed instructions.
- G. Perform initial maintenance according to flooring manufacturer's written recommendations.

**3.6 PROTECTION:**

- A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.
- B. Keep traffic off sheet flooring for 24 hours after installation.
- C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the Resident Engineer.
- D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

- - - E N D - - -



**SECTION 09 67 25**  
**RESINOUS FLOORING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies resinous flooring with integral cove base:
  - 1. High Abuse Non-Climatic Troweled and Sealed Epoxy Mortar Flooring System.

**1.2 RELATED WORK**

- A. Color and location of each type of resinous flooring: As indicated in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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.
    - a. Product data for field applied, interior, paints, coatings, and primers, include printed statement of VOC content indicating compliance with environmental requirements.
  - 2. Application and installation instructions.
  - 3. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.
- C. Qualification Data: For Installer.
- D. 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 (152 mm) square, applied to a rigid backing by installer for this project.
  - 3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.
- E. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
  - 1. Patterns.

2. Edge configurations.
- F. 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.
- G. 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 five (5) 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 Resident Engineer
    - c. Manufacturer and Installer's Representative

3. Review the following:
  - a. Environmental requirements
    - 1) Air and surface temperature
    - 2) Relative humidity
    - 3) Ventilation
    - 4) Dust and contaminants
  - b. Protection of surfaces not scheduled to be coated
  - c. Inspect and discuss condition of substrate and other preparatory work performed
  - d. Review and verify availability of material; installer's personnel, equipment needed
  - e. Coordination with adjacent materials and installations.
  - 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.
- F. Contractor Job Site Log: Contractor shall document daily; the work accomplished, environmental conditions and any other condition event significant to the long term performance of the urethane and epoxy mortar/cement flooring materials installation. The Contractor shall maintain these records for one year after Substantial Completion.
- G. Volatile Organic Compound content to remain under 100g/liter.

## **1.5 MATERIAL PACKAGING DELIVERY AND STORAGE**

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.

- C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).
- D. Keep containers sealed until ready for use.
- E. Do not use materials beyond manufacturer's shelf life limits.
- 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" FAR clause 52.246-21.
- 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. American Society for Testing and Materials (ASTM):

B221-08 .....	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
C307-03 (2008).....	Standard Test Method for Tensile Strength of Chemical- Resistant Mortar, Grouts, and Monolithic Surfacing
C413-01(2006).....	Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes
C531-00(2005).....	Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
C579-01(2006).....	Standard Test Method for Compressive Strength of Chemical- Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
C580-02(2008).....	Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
C811-98(2008).....	Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacing
D1308-02(2007).....	Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
D2047-04 .....	Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine
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
D4226-09 .....	Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
D7234-05 .....	Standard Test Methods for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
F1869-09 .....	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

F2170-09 .....Standard Test Method for Determining Relative Humidity in  
Concrete Floor Slabs Using in situ Probes

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

AMP 501 .....Finishes for Aluminum

## **PART 2 - PRODUCTS**

### **2.1 SYSTEM DESCRIPTION FOR RES-6B (HEAVY DUTY – NON CLIMATIC)**

A. System Description:

1. Epoxy resinous Troweled mortar includes: concrete epoxy primers, three component, 100% solids resin, amine and quartz aggregate mortar, and associated 100% solids general service epoxy sealer. Optional: aliphatic polyurethane sealer finish coat for higher UV stability, and chemical resistance. Texture dependant on use of areas.
2. System may consist of multiple coats, but system as a whole must conform to the characteristics and physical properties indicated.

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 mortar base product, build up layers of broadcast systems will not be accepted. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Primer (Bond Coat): Verify inclusion of primer in manufacturer's system.
  - a. Resin: Epoxy.
  - b. Application Method: Apply by Squeegee and back roller.
2. Mortar:
  - a. Resin: Epoxy with rapidly renewable resin components.
  - b. Formulation Description: 100 percent solids.
  - c. Application Method: Verify specific requirements as systems vary by manufacturer.
    - 1) Trowel application only:
      - a) Thickness of coats: Nominal 3/16 to 1/4 inch (4.76 to 6.35 mm).
      - b) Number of coats: One.
    - 2) Slurry application: Not accepted for non-climatic finish.
  - d. Aggregates: Quartz/silica blend with 25% Recycled Glass
3. Topcoat:

- a. Resin: Epoxy.
- b. Formulation Description: 100 percent solids.
- c. Application Method: Squeegee and finish roll.
  - 1) Thickness of coats: 3 mils.
  - 2) Number of Coats: one (aggressive texture profiles may require more than one coat)
- d. Aggregates: For added slip resistance dependant on area.
  - 1) Dry silica sand (30 Mesh or larger).
  - 2) Aluminum oxide.

D. System Characteristics:

- 1. Color and Pattern: As selected by Resident Engineer from manufacturer's standard colors.
- 2. Integral cove base: 1 inch (25.4 mm) 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 (4.76 to 6.35 mm).
- 4. Finish: Slip resistant.
- 5. Temperature Range: Systems vary by manufacturer; approximate range from a minimum of 45 to 150 degrees F.

E. Physical Properties:

- 1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Compressive Strength	ASTM C579	10,000 psi after 7 days
Tensile Strength	ASTM C307	1,750 psi
Flexural Strength	ASTM C580	4,000 psi
Water Absorption	ASTM C413	0.2%
Slip Resistance Index	ASTM D2047	0.83 dry 0.66 wet
Impact Resistance	ASTM D4226	> 160 in. lbs
Abrasion Resistance	ASTM D4060 CS-17 1000g 1000 cycles	0.1 gm maximum weight loss
Thermal Coefficient of Linear Expansion	ASTM C531	$1.5 \times 10^{-5}$ mm/ °C mm
Hardness	ASTM D2240	> 70

Shore D		
Bond Strength	ASTM D7234	>300 psi 100% concrete failure
Chemical Resistance of the following:	ASTM D1308	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	10 percent	
Sulfuric acid	10 percent	
Trisodium phosphate	5 percent	
Urine		
Feces		
Hydrogen peroxide	28 percent	
Distilled Water		
Sodium Hypochloride	5.28 percent	

## 2.2 SUPPLEMENTAL MATERIALS

- A. Textured Top Coat: Type recommended or produced by manufacturer of seamless resinous flooring system, for wet conditions slip resistance type final finish.
- B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.
- C. Waterproof Membrane: Provide as recommended by the floor coating manufacturer.
- D. Provide a chemical resistant epoxy novolac top coat capable of resisting sustained temperatures up to 120°C (250°F).
- E. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc.
- F. 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 recommended by resinous flooring manufacturer.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine the areas and conditions where monolithic resinous flooring system with integral base is to be installed with the VA Resident Engineer.

- 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, 3.
  - 1. Verify that the MVER is within the acceptable range recommended by the coating manufacturer.

### **3.2 PROJECT CONDITIONS**

- A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F (21 and 32 degrees C) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 70 degrees F (21 degrees C) during cure period.
- B. Maintain relative humidity less than 75 percent.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.
- D. Maintain proper ventilation of the area during application and curing time period.
  - 1. Comply with infection control measures of the VA Medical Center.

### **3.3 INSTALLATION REQUIREMENTS**

- A. The manufacturer's instructions for application and installation shall be reviewed with the VA Resident Engineer for the seamless resinous 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 recommended by the resinous flooring manufacturer.
  - 2. Verify moisture and pH are within acceptable limits.
- C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- D. 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.

- E. Prepare wall to receive integral cove base as recommended by resinous flooring manufacturer:
  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. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- B. 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.
- C. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate.
- D. 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.
- 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. Topcoat: Mix and roller apply the topcoat(s) with strict adherence to manufacturer's installation procedures and coverage rates.

**3.6 TOLERANCE**

- A. From line of plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base.
- B. From radius of cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

**3.7 CURING, PROTECTION AND CLEANING**

- A. Cure resinous 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 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.
- D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

--- E N D ---



**SECTION 09 68 00  
CARPETING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies tile carpeting, adhesives, and other items required for complete installation.

**1.2 RELATED WORK**

- A. Resilient wall base and edge strips: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- B. Walk-Off Carpeting: Section 09 68 19, WALK-OFF CARPETING

**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 300 x 300 mm (12 x 12 inches) of carpets, showing quality, pattern and color specified in on Drawings.
- D. Shop Drawings: Installers layout plan showing seams and cuts for carpet modules.
- 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**

- A. 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**

- A. Carpet and installation for period of 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 Association of Textile Chemists and Colorists (AATCC):
  - AATCC 16-98.....Colorfastness to Light
  - AATCC 129-01.....Colorfastness to Ozone in the Atmosphere under High Humidities
  - AATCC 134-01.....Electric Static Propensity of Carpets
  - AATCC 165-99.....Colorfastness to Crocking: Carpets-AATCC Crockmeter Method
- C. American Society for Testing and Materials (ASTM):
  - ASTM D1335-98 .....Tuft Bind of Pile Yarn Floor Coverings
  - ASTM D3278-97 .....Flash Point of Liquids by Small Scale Closed-Cup Apparatus
  - ASTM D5252-98 .....Operation of the Hexapod Tumble Drum Tester
  - ASTM D5417-99 .....Operation of the Vettermann Drum Tester
  - ASTM E648-00.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- D. The Carpet and Rug Institute (CRI):
  - CRI 104-96.....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: 500 mm (19.7 inches) square tile.
3. Provide static control to permanently control static build up to less than 2.0 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Gauge: 39.4/10 cm. (1/10)
5. Pile Height: Average 2.8 mm (0.11 inch).
6. Pile Fiber: Nylon with recycled content 25 percent pre-consumer, 3 percent post-consumer.
7. Pile Type: Tufted, Textured Loop.
8. Backing materials: Manufacturer's unitary backing designed for glue-down installation using recovered materials.
9. 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.
10. Flammability and Critical Radiant Flux Requirements:
  - a. Test Carpet in accordance with ASTM E 648.
  - b. All Carpet: Class I: Not less than 0.45 watts per square centimeter.
11. 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. In Offices: Minimum APYD 4000.

#### **B. Color, Texture, and Pattern: As specified in on Drawings.**

### **2.2 ADHESIVE AND CONCRETE PRIMER**

- #### **A. Waterproof, resistant to cleaning solutions, steam and water, nonflammable, complies with air-quality standards as well as carpet manufacturer requirements. Adhesives flashpoint minimum 60 degrees C (140 degrees F), complies with ASTM D 3278.**

- B. Release adhesives for modular tile carpet in accordance with written instructions by carpet manufacturer.

### **2.3 EDGE STRIPS (MOLDING)**

- A. See Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

### **2.4 LEVELING COMPOUND**

- A. Provide Portland cement based polymer modifier with latex or polyvinyl acetate resin manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Provide a leveling compound recommended for use over existing substrate, including existing ceramic tile to remain.
- C. 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.
- 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 substrate 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 and cementitious leveling compound prior to adhesive application for moisture and surface alkalinity per CRI 104 Section 6.3.1 or per ASTM E1907.

### **3.2 CARPET INSTALLATION**

- A. Do not install carpet until work of other trades including painting is complete and dry.
- B. Install as recommended by the manufacturer and as follows.
- C. 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.

- D. Secure carpet to subfloor of spaces with adhesive applied as recommended by carpet manufacturer.
- E. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- F. 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.
- G. 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 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.

- - - E N D - - -



**SECTION 09 68 19  
WALK-OFF CARPETING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies specialty carpet tile designed for entry ways, and other items required for complete installation.

**1.2 RELATED WORK**

- A. Resilient wall base and edge strips: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- B. Non-Walk-Off Carpeting: Section 09 68 00, CARPETING.

**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 300 x 300 mm (12 x 12 inches) of carpets, showing quality, pattern and color specified in on Drawings.
- D. Shop Drawings: Installers layout plan showing seams and cuts for carpet modules.
- 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**

- A. 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**

- A. Carpet and installation subject to terms of "Warranty of Construction" article in Section 00 72 00, GENERAL CONDITIONS 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 Association of Textile Chemists and Colorists (AATCC):
  - AATCC 16-98.....Colorfastness to Light
  - AATCC 129-01.....Colorfastness to Ozone in the Atmosphere under High Humidities
  - AATCC 134-01.....Electric Static Propensity of Carpets
  - AATCC 165-99.....Colorfastness to Crocking: Carpets-AATCC Crockmeter Method
- C. American Society for Testing and Materials (ASTM):
  - ASTM D1335-98 ..... Tuft Bind of Pile Yarn Floor Coverings
  - ASTM D3278-97 ..... Flash Point of Liquids by Small Scale Closed-Cup Apparatus
  - ASTM D5252-98 ..... Operation of the Hexapod Tumble Drum Tester
  - ASTM D5417-99 ..... Operation of the Vettermann Drum Tester
  - ASTM E648-00.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- D. The Carpet and Rug Institute (CRI):
  - CRI 104-96.....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. Specifically designed to trap and contain excess dirt and moisture at the door. Stain resistant.
3. Manufacturers standard construction commercial carpet:
  - a. Modular Tile: 457 mm (18 inches) square tile.
4. Provide static control to permanently control static build up to less than 2.0 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
5. Gauge: (5/32)
6. Pile Height: 2.89 mm (0.114 inch).
7. Pile Fiber: 54% Polypropylene 46% Type 6.6 Nylon.
8. Pile Type: Bi-Level Textured Tufted Loop.
9. Backing materials: Manufacturer's unitary backing designed for glue-down installation using recovered materials.
10. 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.
11. Flammability and Critical Radiant Flux Requirements:
  - a. Test Carpet in accordance with ASTM E 648.
  - b. All Carpet: Class I: Not less than 0.45 watts per square centimeter.
12. Density: Average Pile Yarn Density (APYD): 12,000

#### **B. Color, Texture, and Pattern: As specified in on Drawings.**

### **2.2 ADHESIVE AND CONCRETE PRIMER**

- A. Waterproof, resistant to cleaning solutions, steam and water, nonflammable, complies with air-quality standards as well as carpet manufacturer requirements. Adhesives flashpoint minimum 60 degrees C (140 degrees F), complies with ASTM D 3278.
- B. Release adhesives for modular tile carpet in accordance with written instructions by carpet manufacturer.

**2.3 EDGE STRIPS (MOLDING)**

- A. See Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

**2.4 LEVELING COMPOUND**

- A. See Section, 09 68 00, CARPETING.

**PART 3 - EXECUTION****3.1 SURFACE PREPARATION**

- A. See Section, 09 68 00, CARPETING.

**3.2 CARPET INSTALLATION**

- A. Do not install carpet until work of other trades including painting is complete and dry.
- B. Install as recommended by the manufacturer and as follows.
- C. 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.
- D. Secure carpet to subfloor of spaces with adhesive applied as recommended by carpet manufacturer.
- E. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- F. 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.
- G. 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 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.

--- E N D ---



**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 and striping or markers and identity markings.

**1.2 RELATED WORK**

- A. Location, color and texture (Class): Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
- C. 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.
- D. Schedule: Show each system of paint to be used listing primer, intermediate and finish coat product, and where each system will be applied.
- E. Sample Panels:
  - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.

2. Panels to show color: Composition board, 100 by 250 by 3 mm (4 inch by 10 inch by 1/8 inch).
  3. 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.
  4. Step back successive coats so each coat can be clearly seen.
  5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- F. Manufacturers' Certificates indicating compliance with specified requirements:
1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.

#### **1.4 DELIVERY AND STORAGE**

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
1. Name of manufacturer.
  2. Product type.
  3. Batch number.
  4. Instructions for use.
  5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
1. Federal Specification Number, where applicable, and name of material.
  2. Surface upon which material is to be applied.
  3. If paint or other coating, state coat types; prime, body or finish.
- C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).



- D5894-05 .....Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
- 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. Environmental Protection Agency (EPA)
- Method #24-90.....Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings
- G. Federal Specifications (Fed Spec):
- TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)
- H. Master Painters Institute (MPI):
- No. 22-04 .....Aluminum Paint, High Heat (up to 590° - 1100F) (HR)
- No. 43-04 .....Interior Satin Latex, (MPI Gloss Level 4)
- No. 44-04 .....Interior Low Sheen Latex, (MPI Gloss Level 2)
- No. 94-04 .....Exterior Alkyd, Semi-Gloss (EO)
- No. 153-04 .....Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)
- No. 163-04 .....Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5)
- I. Steel Structures Painting Council (SSPC):
- SSPC SP 1-00 .....Solvent Cleaning
- SSPC SP 2-00 .....Hand Tool Cleaning
- SSPC SP 3-00 .....Power Tool Cleaning

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. High Heat Resistant Coating (HR): MPI 22.
- B. Interior Satin Latex: MPI 43.
- C. Interior Low Sheen Latex: MPI 44.
- D. Exterior Alkyd, Semi-Gloss (EO): MPI 94.
- E. Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5): MPI 153

F. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5): MPI 163

## **2.2 PAINT PROPERTIES**

- A. All primers and paints to be very low odor/low VOC.
- B. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- C. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.
- D. Polyurethane Fortified High Durability Wall Paint: Acrylic latex fortified coating with crosslinked polyurethane.
  - 1. Minimum Performance:
    - a. VOC: Less than 150 g/L of volatile organic compounds.
    - b. Scrub Test (ASTM D2486): Not less than 7000 cycles
    - c. Shall contain an anti-microbial agent designed to fight mold, mildew and bacteria.

## **2.3 REGULATORY REQUIREMENTS**

- A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
  - 1. Volatile Organic Compounds (VOC): VOC content of paint materials shall not exceed local, state or district requirements.
  - 2. Lead-Base Paint:
    - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
    - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
  - 3. Asbestos: Materials shall not contain asbestos.
  - 4. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.

5. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
6. Comply with the Regional Ozone Transport Commission (OTC) regulations regarding Volatile Organic Content (VOC).

## **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.

### **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. 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.

D. 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. Tint successive coats sufficiently to make it possible to identify individual coats.
- D. Apply each coat evenly and cover substrate completely.
- E. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
- F. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
- G. Apply by brush, roller or spray, except as otherwise specified.
- H. Do not spray paint in existing occupied spaces unless approved by Resident Engineer, except in spaces sealed from existing occupied spaces.
  - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
  - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical

equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.

- I. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

### **3.5 PRIME PAINTING**

- A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Provide primer recommended by the finish paint manufacturer for use with the substrate and finish paint specified.

### **3.6 INTERIOR FINISHES**

- A. Metal Doors, Frames and Miscellaneous Metal:
  - 1. Apply to exposed surfaces.
  - 2. Two coats Low VOC, 100% Acrylic, Semi-gloss, MPI 153, 163 or equivalent.
  - 3. Design Basis: Sherwin Williams Pro Industrial 0 VOC Acrylic, Semi-Gloss, B66-650.
- B. High Abuse Gypsum Board Walls (As Indicated):
  - 1. Two coats polyurethane-fortified acrylic latex. (See Part 2): Eggshell finish.
  - 2. Design Basis: Scruffmaster, Scrub Tough by Master Coating Technologies: [www.scuffmaster.com](http://www.scuffmaster.com).
- C. Concrete Walls and Ceilings and Portland Cement Plaster Ceilings:
  - 1. Two coats Low VOC, 100% Acrylic Eg-Shel, MPI 153, 163 or equivalent.
  - 2. Design Basis: Sherwin Williams Pro Industrial 0 VOC Acrylic, Eg-Shel B66-660.
- D. Gypsum Board Walls and Ceilings:
  - 1. Two coats Low VOC Acrylic, Egg-shell, MPI 44
  - 2. Design Basis: Sherwin Williams ProMar 200 Interior Latex Eg-Shell, B20W2200

### **3.7 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. Prepare surfaces as recommended by paint manufacturer.

1. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
  2. Sand or dull glossy surfaces prior to painting.
  3. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

### **3.8 PAINT COLOR**

- A. See Section 09 06 00, SCHEDULE FOR FINISHES and schedules on Drawings.
- B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.
- C. Coat Colors:
1. Color of priming coat: Lighter than body coat.
  2. Color of body coat: Lighter than finish coat.
  3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- D. Painting, Caulking, Closures, and Fillers Adjacent to Other Surfaces:
1. Paint to match color of adjacent surface.
  2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

### **3.9 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. 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.

- C. Paint after tests have been completed.
- D. Omit prime coat from factory prime-coated items.
- E. 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.
- F. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.
- G. Color:
  - 1. 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.
  - 2. 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.
  - 3. 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).
  - 4. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.
- H. 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 94 degrees C (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.
  - 2. Interior Locations Including In Crawl Spaces:
    - a. Apply two coats of MPI 153 (Light Industrial Coating, Interior, Water Based, Semi-Gloss; MPI Gloss Level 5) to following items:

- 1) Metal under 94 degrees C (200 degrees F) of items such as bare piping, fittings, hangers and supports.
- 2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
- 3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
- b. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 94 degrees K (200 degrees F) of following items:
  - 1) Steam line flanges, bare pipe, fittings, valves, hangers and supports over 94 degrees K (200 degrees F).
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 Interior Latex Primer Sealer recommended by finish paint manufacturer and one coat of MPI 43 (Interior Satin Latex, MPI Gloss Level 4).

### **3.10 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 of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
  2. Painting of ferrous metal and galvanized metal.
  3. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
  1. Prefinished items:
    - a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
    - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
  2. Finished surfaces:
    - a. Hardware except ferrous metal.
    - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.

- c. Signs, fixtures, and other similar items integrally finished.
- 3. Concealed surfaces:
  - a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
  - b. Inside walls or other spaces behind access doors or panels.
- 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. Ceilings, walls, columns in interstitial spaces.
- 10. Ceilings, walls, and columns in pipe basements.

### **3.11 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 12 000 mm (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 - 414 kPa (60 psig) and above.
  - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
  - c. Low Pressure - 103 kPa (14 psig) and below.
  - d. Add Fuel oil grade numbers.
6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off		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

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE PARTITION" or "FIRE PARTITION" as applicable.
3. Locate not more than 6100 mm (20 feet) on center on corridor sides of partitions, and with a least one message per room on room side of partition.
4. Use semigloss paint of color that contrasts with color of substrate.

### 3.12 PROTECTION CLEAN UP, AND TOUCH-UP

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

--- E N D ---

**SECTION 09 96 59**  
**HIGH-BUILD GLAZED COATINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies a special coating (SC) system designed to provide on interior masonry or other surfaces a glazed tile like finish.

**1.2 RELATED WORK**

- A. Location, color and texture (Class): Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Literature and data describing the coating material to be furnished. Printed application for instructions for each substrate.
- C. Samples:
  - 1. Material samples, 150 mm (six inches) square, showing the number of coats of each coating material on each substrate to which the material is to be applied. Apply coating to the samples in a setback procedure, leaving exposed a portion of the substrate and subsequent portions of each coat.
  - 2. Color samples, minimum 75 mm (three inches) by 125 mm (five inches) of each color and texture (Class) specified.
- D. Certificates:
  - 1. Certifying that the coating complies with requirements of this specification, including resistance to abrasion and resistance to perspiration.
  - 2. Certifying that the coating supplied is the same, with manufacturing tolerances, as the coating tested.
- E. Test Reports: Reports of tests certifying compliance with requirement specified.

**1.4 ENVIRONMENTAL REQUIREMENTS**

- A. Apply coating only when surface and air ambient temperature is above 10<sup>0</sup>C (50 degrees F) and maintained for a period of not less than 48 hours after applications, except as otherwise required by the coating manufacturer.

## 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 Materials (ASTM):
  - D2240-05 (2010).....Standard Test Method for Rubber Property—Durometer Hardness.

## PART 2 - PRODUCTS

### 2.1 GLAZED COATING

- A. All materials in a single system (Primer, intermediate coat and top coat) shall be by a single manufacturer.
- B. Epoxy Urethane System for Exposed Exterior Metal: 3 Coat Epoxy/Urethane (where indicated)
  - 1. Prime Coat: Polyamide epoxy, recommended by manufacturer for direct application to galvanized surfaces. Acceptable products include:
    - a. Sherwin Williams: Macropoxy 646
    - b. PPG Paints: Pitt-Guard 95-245
    - c. Tnemec: 66 Hi-build
    - d. Other polyamide epoxy paints with a similar performance record.
  - 2. Intermediate Coat: Polyamide epoxy: Same paint as prime coat. Must be recommended by manufacturer for use with the scheduled top coat.
  - 3. Top Coat: Aliphatic Acrylic Polyurethane, Finish Gloss. Recommended by the manufacturer for uses as exterior top coat over scheduled epoxy intermediate coat. Acceptable products include:
    - a. Sherwin Williams: Acrolon 218 HS
    - b. PPG Paints: Pittthane II 94-2800
    - c. Tnemec: 175 Endura-shield II
    - d. Other aliphatic acrylic polyurethane paints with a similar performance record.
- C. Chemically Resistant Epoxy Coating System (for use on Decontamination Shower walls and ceiling).
  - 1. Recommended product design lining tanks containing waste water and petroleum products or similar product with high chemical resistance.
  - 2. Recommended for application to concrete block and Portland cement plaster.
  - 3. Hardness: 70 per ASTM D-2240, Shore D

4. VOC: Not more than 100 g/L.
5. Color: Able to match colors chosen by the Architect.

## **2.2 PRIMER**

- A. As recommended by finish coat manufacturer for the substrate indicated.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION OF SURFACES**

- A. Prepare as recommended by the coating manufacturer and the following.
- B. Patch surfaces as required for receiving glazed coating. Fill masonry block and make surfaces smooth and free of voids and pinholes. Assure surfaces are clean, dry, well cured, sound and free of ridges and depressions.
- C. Wait for new mortar and cementitious plaster surfaces to cure for not less than 30 days before starting application of the coating system.
- D. Remove or protect items not requiring coating.

### **3.2 APPLICATION**

- A. Prepare and apply coating as recommended by the manufacturer.
- B. Apply the number of coats recommended by the coating manufacturer.
- C. Finish Film Thickness: Apply materials at not less than the manufacturer's recommended spreading rate.
- D. Make edges of glazed coatings sharp and clean without overlapping adjoining other materials or colors.
- E. Apply glazed coating at the Decontamination Shower walls and ceiling.
  1. Overlap and seal to integral cove base of flooring.

### **3.3 CLEANING AND PROTECTION**

- A. During progress of the work and upon completion, promptly clean adjacent surfaces and materials of spills, spatters, drips, and stains from glazed coatings application. Remove glazed coatings by proper methods exercising care to prevent damage to finished surfaces and materials.
- B. Protect work of other trades against damage resulting from glazed coatings work.
- C. Touch up damaged coating surfaces before final acceptance.

--- E N D ---



## **SECTION 10 11 00 VISUAL DISPLAY BOARDS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies markerboards, tackboards, and related items.
- B. Boards may be either factory or field assembled.
- C. Where shown, assemble either chalkboards or markerboards with tackboards into a single unit.

#### **1.2 QUALITY ASSURANCE**

- A. Boards shall be the products of one manufacturer.

#### **1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Shop Drawings: Identifying all parts by name and material and showing design, construction, installation, anchorage and relation to adjacent construction.
- C. Manufacturer's Literature and Data:
  - 1. Markerboard
  - 2. Tackboard
- D. Samples:
  - 1. Chalkboard and markerboard writing surface, 300 by 300 mm (six by six inches), each color, mounted on backing.
  - 2. Tackboard surface, 300 by 300 mm (six by six inches), each color, mounted on backing
  - 3. Integrally colored anodized aluminum, 300 mm (six inch) length.
  - 4. Each accessory (after approval, may be used in the work).

#### **1.4 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 500 Series.....Metal Finishes Manual
  - AMP 501.....Finishes for Aluminum
- C. American National Standards (ANSI):
  - Z97.1-04.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-06 ..... Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire,  
Shapes and Tubes

C1036-06 ..... Flat Glass

C1048-04 ..... Heat-Treated Flat Glass-Kind HS, Kind FT Coated and  
Uncoated Glass

F104-03 ..... Nonmetallic Gasket Materials

## E. Composite Panel Association (CPA):

A208.1-06 ..... Particleboard

A135.4-04 ..... Basic Hardboard

**PART 2 - PRODUCTS****2.1 MATERIALS:**

A. Aluminum, extruded: ASTM B221.

B. Backing: Hardboard, AHBA A135.4 or particleboard, CPA A208.1.

C. Tack Surface: Composition Cork

**2.2 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.

## 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 S-100, laminated to a hardboard or particleboard backing, 9 mm to 13 mm (3/8 to 1/2-inch) thick, and a 0.13 mm (0.005-inch) thick aluminum foil back sheet laminated to back-face.
2. Frames (Trim): Extruded aluminum, 1.5 mm (0.060-inch) thick, snap-on type, approximate face width 44 mm (1-3/4 inch), depth and configuration as required to return to wall and engage clips.
3. Trough: Extruded aluminum, 2.34 mm (0.092-inch) thick, not less than 75 mm (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. 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 board writing surface and clips for snap-on frames, map rail and chalk tray.
  6. Clips: Manufacturer's standard as required to support frame, mullions, display rail, and trough.
- C. Fabrication: Boards 3660 mm (12 feet) or less in length shall be in one piece.
- D. Finish exposed aluminum surfaces as follows:
1. AA 45 chemically etched medium matte, with clear anodic coating Class II Architectural, 0.4 mils thick (AA-M12C22A32).
  2. AA 45 chemically etched medium matte, with integrally colored anodic coating, Class II Architectural, 0.4 mils thick (AA-M12C22A32, of color to match approved sample).

### **2.3 TACKBOARDS**

- A. Tack Surface: Factory assembly consisting of face sheet of 1/4 inch (6 mm) thick, burlap backed composition cork, laminated to a hardboard or particleboard backing, 9 mm to 13 mm (3/8 to 1/2-inch) thick.
- B. Surface:
- C. Frame: Same as for marker board.

## **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 AND TACKBOARDS**

- A. Mount board with adhesive and blocking pads spaced 16 inches on center each way.
- B. Grounds designed to receive clips for snap-on trim shall be continuous and be secured 300 mm (12 inches) on center. Space clips 300 mm (12 inches) on center.
- C. Miter trim at corners, conceal fasteners. Modify trim as required to conform to surrounding construction details.

--- E N D ---



**SECTION 10 14 00  
SIGNAGE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies interior signage for room numbers, directional signs, code required signs, and temporary interior signs.

**1.2 REFERENCE:**

- A. Appendix Three: MASTER INTERIOR SIGNAGE DESIGN AND DETAIL DOCUMENT prepared by Visual Communications

**1.3 SUBMITTALS**

- A. See Page 14 of Master Interior Signage Design and Detail Document prepared by Visual Communications. See Appendix 3.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. See Master Interior Signage Design and Detail Document prepared by Visual Communications. See Appendix 3.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. See Master Interior Signage Design and Detail Document prepared by Visual Communications. See Appendix 3.

**3.2 SCHEDULE**

- A. See the following pages:

- - - - END - - -

**BUILDING ONE - EMERGENCY DEPARTMENT**  
**SIGNAGE--Revisions under ED Expand and Renovate**

SIGN TYPE	NEW RM NO	EXISTING NO	MESSAGE	COMMENTS	FLOOR PLAN NAME/NUMBER REFERENCE ONLY
13	C1503A	NEW	Flag sign (2 sided) to read: WHEELCHAIRS	New Sign Omit under Alternate No. 3	Wheelchair C1503A
A		1515	(EXIST) Top Panel to read: 1515 (T&B) (EXIST) Large Bottom Panel to read: TRIAGE (T&B)	Retain top panel in place. Relocate bottom panel to new Triage 1556 at completion of Project.	E1515
A		1517	(EXIST) Top Panel to read: 1517 (T&B) (EXIST) Large Bottom Panel to read: TRIAGE (T&B)	Retain top panel in place. Relocate bottom panel to new Triage 1558 at completion of Project.	E1517
A	1534	NEW	(NEW) Top Panel to read: 1534 (T&B) (NEW) Large Bottom Panel to read: STERILE STORAGE (T&B)	New Sign	Sterile Storage 1534
A	1536	NEW	(NEW) Top Panel to read: 1536 (T&B) (NEW) Large Bottom Panel to read: AUTHORIZED STAFF ONLY (T&B)	New Sign	Medication 1536
A	1537	NEW	(NEW) Top Panel to read: 1537 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 8 1537
A	1538	NEW	(NEW) Top Panel to read: 1538 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 1 1538
A	1539	NEW	(NEW) Top Panel to read: 1539 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 7 1539
4.02	1539A	NEW	(NEW) Panel to read: PATIENT RESTROOM (T&B)	New Sign--locate in 1539	Toilet 1539A
4.02	1539A	NEW	(NEW) Panel to read: PATIENT RESTROOM (T&B)	New Sign--locate in 1541	Toilet 1539A
A	1540	NEW	(NEW) Top Panel to read: 1540 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 2 1540
A	1541	NEW	(NEW) Top Panel to read: 1541 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 6 1541
9.03	1542	NEW	(NEW) Panel to read: 1542 (T&B) (women/men/accessible picto) PATIENT RESTROOM (T&B)	New Sign	Toilet 1542

SIGN TYPE	NEW RM NO	EXISTING NO	MESSAGE	COMMENTS	FLOOR PLAN NAME/NUMBER REFERENCE ONLY
A	1543	NEW	(NEW) Top Panel to read: 1543 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 5 1544
4.02	1543A	NEW	(NEW) Panel to read: PATIENT RESTROOM (T&B)	New Sign--locate in 1543	Toilet 1543A
4.02	1543A	NEW	(NEW) Panel to read: PATIENT RESTROOM (T&B)	New Sign--locate in 1545	Toilet 1543A
A	1544	NEW	(NEW) Top Panel to read: 1544 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 3 1544
A	1545	NEW	(NEW) Top Panel to read: 1545 (T&B) (NEW) Large Bottom Panel to read: CART ROOM (T&B)	New Sign	CART 4 1545
A	1546	NEW	(NEW) Top Panel to read: 1546 (T&B) (NEW) Large Bottom Panel to read: DECON 1 (T&B)	New Sign	Decon 1 1546
A	1546A	NEW	(NEW) Top Panel to read: 1546A (T&B) (NEW) Large Bottom Panel to read: DECON 1 (T&B)	New Sign--locate in 1580	Decon 1 Shower 1546A
A	1548	NEW	(NEW) Top Panel to read: 1548 (T&B) (NEW) Large Bottom Panel to read: DECON 2 (T&B)	New Sign	Decon 2 1548
A	1548A	NEW	(NEW) Top Panel to read: 1548A (T&B) (NEW) Large Bottom Panel to read: DECON 2 (T&B)	New Sign--locate in 1580	Decon 2 Shower 1548A
A	1549	NEW	Text TBD	New Sign--locate in 1547	Vestibule 1549
A	1549	NEW	Text TBD	New Sign--locate in 1580	Vestibule 1549
19.01		1550	(EXIST) Individual Letters to read: EMERGENCY ADMISSIONS	Remove and Relocate Sign to Waiting 1575 at completion of Project. Omit under Alternate No. 3	E1550
A	-	1554B	(EXIST) Top Panel to read: 1554B (T&B) (EXIST) Large Bottom Panel to read: OFFICE DATA VALIDATION (T&B)	Remove sign and turn over to Owner. Omit Removal under Alternates No. 2 & 3	E1554B (east door)
E1A	-	C1502	(EXIST) Large soffit mount to read: ^ Release of Information ^ South Entrance	Remove sign and turn over to Owner.	Corridor C1502

SIGN TYPE	NEW RM NO	EXISTING NO	MESSAGE	COMMENTS	FLOOR PLAN NAME/NUMBER REFERENCE ONLY
E1A	-	C1502	(EXIST) Large soffit mount to read: ^ 1500 EMERGENCY	Relocate sign to west face of bulkhead	Corridor C1502
A	-	1556	(RELOC) Top Panel to read: 1556 (T&B) (RELOC) Large Bottom Panel to read: ELIGIBILITY SCHEDULING (T&B)	Relocate top panel to new door location. Remove bottom panel and turn over to Owner. Omit Removal/Relocation under Alternates No. 2 & 3.	E1556
A	1556	RELOC	(RELOC) Top Panel to read: 1556 (T&B) (RELOC) Large Bottom Panel to read: TRIAGE (T&B)	Relocated top and bottom panels. Omit Relocation under Alternates No. 2 & 3	Triage 1 1556
A	-	1558	(EXIST) Top Panel to read: 1558 (T&B) (EXIST) Large Bottom Panel to read: BREAKROOM (T&B)	Reloc top panel to new door location. Remove bottom panel and turn over to Owner. Omit Removal/Relocation under Alternates No. 2 & 3.	E1558
A	1558	RELOC	(RELOC) Top Panel to read: 1558 (T&B) (RELOC) Large Bottom Panel to read: TRIAGE (T&B)	Install in Corridor C1502. Relocate top panel from E1558. Omit Relocation under Alternates No. 2 & 3.	Triage 2 1558
G1	-	C1503	(EXIST) Wall Mount Directory to read: Map on the left side of the panel List on the Right side of the panel Right side to read: > Release of Information < Patient Travel < VA Shuttle ^ Clinic 1400/1600 ^ Main Lobby ^ Canteen ^ Gift Shop ^ 1100/1200/1300 ^ 1700/1800/1900	Remove sign and turn over to Owner.	Corridor C1503
A	-	1558B	(EXIST) Top Panel to read: 1558B (T&B) (EXIST) Large Bottom Panel to read: BILLING & INSURANCE (T&B)	Remove sign and turn over to Owner. Omit Removal under Alternates No. 2 & 3.	E1558B
A	-	1558B	(NEW) Top Panel to read: 1558B (T&B) (NEW) Bottom Panel to read: <i>Copy TBD</i>	New Sign under Alternate No. 2 only. Mount in 1575. Omit under Base Bid and Alternates No. 1 & 3.	RECEPTION 1575
B	-	1558C	(EXIST) Top Panel to read: 1558C (T&B) (EXIST) Middle Panel to read: FINANCIAL COUNSELOR (EXIST) Bottom Panel to read: Name	Remove sign and turn over to Owner. Omit Removal under Alternates No. 2 & 3.	E1558C

SIGN TYPE	NEW RM NO	EXISTING NO	MESSAGE	COMMENTS	FLOOR PLAN NAME/NUMBER REFERENCE ONLY
A	1560	NEW	(NEW) Top Panel to read: 1560 (T&B) (NEW) Large Bottom Panel to read: TRIAGE (T&B)	New Sign. Omit under Alternates No. 2 & 3.	Triage 3 1560
11.01	-	C1503	(EXIST) In Case of Fire Sign	Retain Sign in Place	Corridor C1503 @ Elevator
A	1570	NEW	(NEW) Top Panel to read: 1570 (T&B) (NEW) Large Bottom Panel to read: SECURITY (T&B)	New Sign. Omit under Alternate No. 3.	Security 1570
9.02	1571	NEW	(NEW) Top Panel to read: 1571 (T&B) (NEW) Bottom Panel to read: (women/accessible picto) WOMEN (T) (B message to read: women accessible restroom)	New Sign. Omit under Alternates No. 2 & 3.	Women 1571
9.02	1573	NEW	(NEW) Top Panel to read: 1573 (T&B) (NEW) Bottom Panel to read: (men/accessible picto) MEN (T) (B message to read: men accessible restroom)	New Sign. Omit under Alternates No. 2 & 3.	Men 1573
19.01	1575	RELOC	(RELOC) Individual Letters to read: EMERGENCY ADMISSIONS	Relocate Sign--Individual letters, soffit mount above desk. Omit under Alternate No. 3	Reception 1575
A	1575A	NEW	(NEW) Top Panel to read: 1575A (T&B) (NEW) Large Bottom Panel to read: AOD (T&B)	New Sign Omit under Alternates No. 2 & 3.	AOD 1575A
A	1575B	NEW	(NEW) Top Panel to read: 1575B (T&B) (NEW) Large Bottom Panel to read: AOD (T&B)	New Sign Omit under Alternates No. 2 & 3.	AOD 1575B
A	1577	NEW	(NEW) Top Panel to read: 1577 (T&B) (NEW) Large Bottom Panel to read: COUNSEL/NURSE (T&B)	New Sign Omit under Alternates No. 2 & 3.	COUNSEL/NURSE 1575
13	C1503	NEW	(NEW) Flag sign (2 sided) to read: VENDING	New Sign Omit under Alternates No. 2 & 3.	Corridor C1503 @ Vending Alcove



## **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. Steel shapes for suspending track assembly: Section 05 50 00, METAL FABRICATIONS and 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. One 300 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop.
  - 2. One clip anchor for fastening track to grid system of acoustical ceilings.
  - 3. One curtain carrier.
- 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):
  - B221-06 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
  - B456-03 .....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

- C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

## **PART 2 - PRODUCTS**

### **2.1 CUBICLE CURTAIN TRACKS**

- A. Surface mounted.
1. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.
- B. Curtain Carriers: Nylon or delrin carriers, with either nylon or delrin wheels on metal, delrin, or nylon axles. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain and hook assembly, or delrin carriers may have moulded on delrin hooks. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel. Provide 2.2 carriers for every 300 mm (onefoot) of each section of each track length, plus one additional carrier.
- C. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.
- D. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Any operating mechanism shall be removable with common tools.

### **2.2 FASTENERS**

- A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.
- B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized (except in high moisture areas use stainless steel).
- C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

### **2.3 FINISHES**

- A. Aluminum: Finish numbers for aluminum specified are in accordance with The Aluminum Association's Designation System. AA-C22A31 finish
- B. Chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mils thick.

## **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 4800 mm (16 feet) without joints. Form corner bend on a 300 mm (12 inch) radius.
- C. Provide steel anchor plates, supports, and anchors for securing components to building construction.
- D. Form flat surface without distortion.
- E. Shop assemble components and package complete with anchors and fittings.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install tracks after finish painting and ceiling finishing operations are complete.
- B. Install track level and securely anchor to the ceiling to form a rigid installation.
- C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 600 mm (24 inches) on center.
- D. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 3 mm (1/8-inch) diameter fastenings or concealed clips spaced not more than 900 mm (three feet) on center.
- E. Install suspended track seven feet, three inches above the finished floor, with hangers spaced no more than four feet on center. At ceiling line, provide flange fittings secured to hangers with set screws. Secure track to walls with flanged fittings and to hangers with special fittings.
- F. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.
- G. 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.

--- E N D ---



**SECTION 10 25 13**  
**PATIENT BED SERVICE WALLS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies the installation and connection of the patient wall systems both horizontal and vertical. Patient wall systems are also referred to as prefabricated bedside patient units or PBPUs.

**1.2 RELATED WORK**

- A. Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES AND Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES: Requirements for air, oxygen and vacuum outlets in the patient wall units.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Raceways and outlet boxes for wiring.
- D. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- E. Section 26 27 26, WIRING DEVICES: Wiring devices to be installed in the patient wall units.
- F. Section 26 24 16, PANELBOARDS: Panelboard requirements for patient wall units with a panelboard.
- G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.
- H. Section 26 51 00, INTERIOR LIGHTING: Lighting fixture requirements when installed in or connected to the patient wall units.
- I. Section 27 52 23, NURSE CALL/CODE BLUE SYSTEMS: Nurse Call and Code One requirements for installation in the patient wall units.

**1.3 APPLICABLE PUBLICATIONS:**

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in text by the basic designation only.

- B. National Fire Protection Association (NFPA):
  - 70 .....National Electrical Code (NEC)
  - 99 .....Health Care Facilities
- C. Underwriters Laboratories, Inc. (UL):
  - .....UL listed in product category SECTIONS AND UNITS (QQXX). This standard used to investigate listed products in this category is NFPA 70 (NEC).

## **PART 2 - PRODUCTS**

### **2.1 PATIENT WALL SYSTEMS**

- A. Provided by Owner for installation by General Contractor.
- B. Contractor shall be responsible to obtain from the Owner exact description of the products being supplied and shall provide anchorage devices and other incidental products and shall coordinate locations of plumbing, electrical and communication connections as necessary to allow for a complete and functioning installation.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION:**

- A. Verify and conform to manufacturer's instructions and recommendations.
- B. Installation shall be in accordance with NFPA 70 (NEC), NFPA 99, and as shown on the drawings.
- C. Compressed Air, Oxygen and Vacuum System Equipment:
  - 1. Install and test the equipment and piping system in accordance with the drawings and Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
  - 2. Install and make connections as required for a complete and operational patient wall system for each unit.

--- E N D ---

## **SECTION 10 26 00 WALL AND DOOR PROTECTION**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section specifies handrail/wall guard combinations and corner guards.

#### **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. Corner Guards.
- D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

#### **1.4 DELIVERY AND STORAGE**

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
- B. Protect from damage from handling and construction operations before, during and after installation.
- C. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):

B221-05 .....Standard Specification for Aluminum and Aluminum-Alloy  
Extruded Bars, Rods, Wire, Profiles, and Tubes1

D 256-06a .....Standard Test Methods for Determining the Izod Pendulum  
Impact Resistance of Plastics

D635-06 .....Standard Test Method for Rate of Burning and/or Extent and  
Time of Burning of Plastics in a Horizontal Position

E84-08a .....Standard Test Method for Surface Burning Characteristics of  
Building Materials

C. Society of American Automotive Engineers (SAE):

J 1545-86 .....Instrumental Color Difference Measurement for Exterior  
Finishes.

D. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series .....Metal Finishes Manual

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

A. Resilient Material:

1. Extruded and injection molded polyethylene terephthalate (PETG) – PVC and PBA free - meeting following requirements:
  - a. Minimum impact resistance of 8043 Pa (168 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.

B. Aluminum: 6063-T6 alloy, ASTM B221.

### **2.2 CORNER GUARDS**

A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type with 76 mm (3 inch) faces.

1. Snap-on corner guard formed from resilient material, minimum 1.98 mm (0.078-inch) thick, free floating on a continuous 1.57 mm (0.062-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.

### **2.3 WALL GUARDS AND HANDRAILS**

#### **A. Resilient Wall Guard and Handrail Combination:**

1. Handrail/Wall Guard Combination: Bumper of snap-on covers of resilient material and wood handrail mounted on the same wall mounted bracket system.
  - a. Cover thickness: Minimum 1.98 mm (0.078-inch)
  - b. Mounting: Continuous, extruded aluminum retainer, minimum 2.25 mm (0.088-inch) thick, anchored to wall at maximum 760 mm (30 inches) on center.
2. Provide handrail / wall guards 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 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.

### **2.5 FINISH**

- A. 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 RESILIENT HANDRAIL / WALL GUARD COMBINATIONS**

- A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions.

- - - END - - -



**SECTION 10 28 00**  
**TOILET, BATH, AND RELATED ACCESSORIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies manufactured items usually used in dressing rooms, toilets, baths, locker rooms and at sinks in related spaces.
- B. Items Specified:
  - 1. Paper towel dispenser. (Owner furnished, Contractor installed).
  - 2. Toilet tissue dispenser. (Owner furnished, Contractor installed).
  - 3. Soap Dispensers. (Owner furnished, Contractor installed).
  - 4. Sanitary Napkin Disposal. (Owner furnished, Contractor installed).
  - 5. Baby Changing Table (Owner furnished, Contractor installed).
  - 6. Grab Bars (Furnished and installed by Contractor).
  - 7. Anti-Ligature grab bars (Furnished and installed by Contractor).
  - 8. Shower curtain rods (Furnished and installed by Contractor).
  - 9. Clothes hooks, robe or coat (Furnished and installed by Contractor).
  - 10. Anti-Ligature clothing hooks (Furnished and installed by Contractor).
  - 11. Metal framed mirror (Furnished and installed by Contractor).
  - 12. Sharps Containers (Owner furnished, Contractor installed).
  - 13. Glove dispensers (Owner furnished, Contractor installed).
- C. This section also specifies custom fabricated items used in toilets and related spaces.

**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. Manufacturer's Literature and Data:
  - 1. Each product specified.
  - 2. Show material and finish, size of members, and details of construction, installation and anchorage. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.
- C. Samples:

1. 76 mm x 76 mm (3 x 3 inch) sample showing finish and texture. Provide one sample for each different finish.

**D. Manufacturer's Certificates:**

1. Attesting that soap dispensers are fabricated of material that will not be affected by liquid soap or aseptic detergents, Phisohex and solutions containing hexachlorophene.
2. 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(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate,  
Sheet and Strip.
  - A176-99(R2004).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and  
Strip
  - A269-07 .....Seamless and Welded Austenitic Stainless Steel Tubing for  
General Service

- A312/A312M-06.....Seamless and Welded Austenitic Stainless Steel Pipes
- A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B221-06 .....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- B456-03 .....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
- C1036-06 .....Flat Glass
- C1048-04 .....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass
- D635-06 .....Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position
- F446-85 (R2004).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.
- A269-07 .....Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- D3453-01 .....Flexible Cellular Materials - Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications
- D3690-02 .....Vinyl-Coated and Urethane-Coated Upholstery Fabrics
- C. The National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500 Series.....Metal Finishes Manual
- AMP 500-505-88 .....Metal Finishes Manual and Finishes for Stainless Steel
- 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. 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.
- B. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.
- C. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.
- D. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.
- E. Glass: ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.
- F. Foam Rubber: ASTM D3453, Grade BD, Type 2.
- G. 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. Sex 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. 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 PRODUCT FURNISHED BY OWNER FOR CONTRACTOR INSTALLATION**

- A. Paper towel dispenser. Verify exact product with Owner.
- B. Toilet tissue dispenser. Verify exact product with Owner.
- C. Soap Dispensers. Verify exact product with Owner.
- D. Sanitary Napkin Disposal. Verify exact product with Owner.
- E. Baby Changing Table Verify exact product with Owner.
- F. Sharps Containers Verify exact product with Owner.
- G. Glove dispensers Verify exact product with Owner..

## **2.6 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.
- D. Bars:
  - 1. Fabricate from 38 mm (1-1/2 inch) outside diameter tubing.
    - a. Stainless steel, minimum 1.2 mm (0.0478 inch) thick.
  - 2. Fabricate in one continuous piece with ends turned toward walls, except swing up and 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.
  - 4. Provide slip-proof textured gripping surface.
- E. Flange for Concealed Mounting:

1. Minimum of 2.65 mm (0.1046 inch) thick, approximately 75 mm (3 inch) diameter by 13 mm (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. In lieu of providing flange for concealed mounting, and back plate as specified, grab rail may be secured by being welded to a back plate and be covered with flange.
- G. Back Plates:
1. Minimum 2.65 mm (0.1046 inch) thick metal.
  2. Fabricate in one piece, approximately 6 mm (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 metal partitions.

## **2.7 ANTI-LIGATURE GRAB BARS**

- A. Conform to requirements for grab bars except as follows.
- B. Provide with closure plate to close opening formed between wall and bar.
- C. Fasteners to be tamperproof.
- D. Sample Product: Bradley SA70.

## **2.8 SHOWER CURTAIN RODS**

- A. Stainless steel tubing, ASTM A569, minimum 1.27 mm (0.050 inch) wall thickness, 32 mm (1 1/4 inch) outside diameter.
- B. Flanges, stainless steel rings, 66 mm (2 5/8 inch) minimum outside diameter, with 2 holes opposite each other for 6 mm (1/4 inch) stainless steel fastening bolts. Provide a set screw within the curvature of each flange for securing the rod.
- C. Intermediate support for rods over 1800 mm (six feet) long. Provide adjustable ceiling flanges with set screws, tubular hangers and stirrups.

## **2.9 CLOTHES HOOKS-ROBE OR COAT**

- A. Fabricate hook units either of chromium plated brass with a satin finish, or stainless steel, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to the thickness of the metal, or 3 mm (1/8 inch) minimum radius.
- B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to the wall flange, provided with concealed fastenings.

**2.10 ANTI-LIGATURE CLOTHING HOOK**

- A. Fabricate of 14 gage stainless steel with satin finish.
- B. Hook to consist of rod on a pivoting ball that releases when more than 20 lbs of force is applied.
- C. Anchorage to be concealed and tamperproof.
- D. Sample Product: Bradley SA35.

**2.11 METAL FRAMED MIRRORS**

- A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 302 or 304./
- B. Mirror Glass:
  - 1. Minimum 6 mm (1/4 inch) thick.
  - 2. Set mirror in a protective vinyl glazing tape.
  - 3. Use tempered glass for mirrors in Mental Health and Behavioral Nursing units.
- C. Frames:
  - 1. Channel or angle shaped section with face of frame not less than 9 mm (3/8 inch) wide.  
Fabricate with square corners.
  - 2. Use either 0.9 mm (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.
  - 4. Attached Shelf for Mirrors:
    - a. Fabricate shelf of the same material and finish as the mirror frame.
    - b. Make shelf approximately 125 mm (five inches) in depth, and extend full width of the mirror.
    - c. Close the ends and the front edge of the shelf to the same thickness as the mirror frame width.
    - d. Form shelf for aluminum framed mirror as an integral part of the bottom frame member.  
Form stainless steel shelf with concealed brackets to attach to mirror frame.
- D. Back Plate:
  - 1. Fabricate backplate for concealed wall hanging of either zinc-coated, or cadmium plated 0.9 mm (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.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Before starting work notify Resident Engineer in writing of any conflicts detrimental to installation or operation of units.
- B. Verify with the Resident 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. Anchor only so solid masonry or to blocking.
- C. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.
- D. Install accessories plumb and level and securely anchor to substrate.
- E. 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.
- F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance as needed.
- G. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- H. Install accessories to prevent striking by other moving, items or interference with accessibility.
- I. Install wall mirrors in Mental Health and Behavioral Units with tamper resistant screws that are flush mounted so that they will not support a rope or material for hanging.

#### **3.3 CLEANING**

- A. After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

- - - END - - -

## **SECTION 10 44 00 FIRE EXTINGUISHERS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section covers fire extinguishers, fire extinguisher cabinets and accessories.

#### **1.2 SUBMITTALS**

- A. Shop Drawings: Indicate cabinet physical dimensions and relationship to adjacent materials.
- B. Product Data: Provide extinguisher operational features and data on cabinet.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

#### **1.3 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

#### **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. National Fire Prevention Association (NFPA):
  - 10 .....Standard for Portable Fire Extinguishers
- C. Underwriter Laboratories Inc. (UL)
  - UL (FPED).....Fire Protection Equipment Directory

### **PART 2 - PART 2 PRODUCTS**

#### **2.1 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by testing firm acceptable to the authority having jurisdiction for the purpose specified and indicated.
- B. Dry Chemical Type Fire Extinguishers: Cast steel tank, with pressure gage.
  - 1. Class A-B-C.
  - 2. Size: 10 lb, 2A-10B:C (or greater)
  - 3. Finish: Baked enamel, red color.

**2.2 FIRE EXTINGUISHER CABINET**

- A. Type: Fully Recessed (Flush)
- B. Fabrication:
  - 1. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.
  - 2. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.
    - a. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
    - b. Design doors to open 180 degrees.
    - c. Provide continuous hinge, pull handle, and adjustable roller catch.
- C. Finish
  - 1. Finish interior of cabinet body with baked-on semigloss white enamel.
  - 2. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

**2.3 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, chrome-plated. (For locations for which no cabinet is indicated.)

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Verify blocking for anchorage of brackets.

**3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers and accessories in cabinets or hang on bracket.

--- END ---

## **SECTION 10 51 13 LOCKERS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section specifies installation of lockers provided by the Owner.

#### **1.2 RELATED WORK**

- A. Constructs of fixed bases for lockers: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Sealants; Section 07 92 00, JOINT SEALANTS.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Concrete (for curbs): Section 03 30 00, CAST-IN-PLACE CONCRETE.

#### **2.2 LOCKERS**

- A. Provide by Owner.
  - 1. Verify exact size and model with the Owner.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Verify dimensions and configuration of lockers and provide concrete bases to accommodate actual products.
- B. If substrate and bases are the responsibility of another installer, notify Resident Engineer of unsatisfactory preparation before proceeding.

#### **3.2 INSTALLATION**

- A. Assemble lockers as recommended by manufacturer.
- B. Install metal lockers and accessories at locations shown in accordance with manufacturer's instructions.
- C. Install lockers plumb, level, and square.
- D. Anchor lockers to floor or permanent raised curb and wall at 48 inches (1.219 m) or less, as recommended by the manufacturer.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Provide flush hairline joints against adjacent surfaces.
- G. Install sloping tops and metal fillers using concealed fasteners.
- H. Install front bases between legs without overlap or exposed fasteners. Provide end bases on exposed ends.

- I. Install benches by fastening bench tops to pedestals and securely anchoring to the floor using appropriate anchors for the floor material.

### **3.3 ADJUSTING AND CLEANING**

- A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.
- B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation prior to substantial completion.
- C. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

### **3.4 PROTECTION**

- A. Protect installed products until completion of project.

--- E N D ---

**SECTION 12 24 13  
WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Manual pull roller shades.

**1.2 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Describing products to be provided and showing conformance to the requirements of this section.

**PART 2 - PRODUCTS**

**2.1 MAUAL PULL ROLLER SHADES**

- A. Light blocking, cordless.
- B. Material: Vinyl shade material with fiberglass layer.
- C. Total Thickness: 0.030 mm (12 mils)
- D. Washable and fade resistant.
- E. Treated to prevent mold and mildew grow.
- F. Bottom bar may be of wood or another approved material, but must be sealed inside the blind material.
- G. Color: White.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install as recommended by manufacturer and as detailed

- - - E N D - - -



**SECTION 12 32 00  
MANUFACTURED CASEWORK**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies installation of wood, veneered, and metal casework supplied by the Owner to be installed by the Contractor.

**1.2 RELATED WORK**

- A. Custom Casework: Section 06 20 00, FINISH CARPENTRY.
- B. Plumbing in Casework: Section 22 40 00, PLUMBING FIXTURES.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Cabinets, including cabinets with integral lavatories, will be supplied by the Owner
- B. Contractor shall be responsible to obtain from the Owner exact description of the casework being supplied and shall provide anchorage devices and other incidental products and shall coordinate locations of plumbing connections as necessary to allow for a complete and functioning installation.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Verify and conform to any specific instructions and recommendations of the casework manufacturer.
- B. Set casework in place; level, plumb and accurately scribe and secure to walls, and/or floors.
- C. Provide connection for integral plumbing fixtures as necessary.
- D. The installation shall be complete including all trim and hardware. Leave the casework clean and free from defects.

- - - E N D - - -



## **SECTION 12 41 50 SPECIALTY FURNISHINGS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION:**

- A. This section covers specialty furnishing products provided and installed under this Contract.

#### **1.2 SUBMITTALS**

- A. Product Data: For each product provided under this sections.

### **PART 2 - PART 2 PRODUCTS**

#### **2.1 HALLWAY SAFETY MIRRORS**

- A. Wall or ceiling mounted partial dome mirrors.
- B. Material: Acrylic.
- C. Backing: Steel or none.
- D. Mounting: Wall mounted or grid mount dome.

#### **2.2 WALL ACCESSORY MODULE**

- A. Mounted, modular system for organizing clocks, monitors, magazine holders, bulletin boards, etc.
- B. Design Basis: Peter Pepper Products, "evolution modular wall system".
  - 1. Edge Trim: Style "Lineal-1, Natural Maple.
  - 2. Exposed Wood Faces: Natural Maple.
- C. Provide specific modules and inserts as indicated on drawings.
  - 1. Chart Holder: ECH
  - 2. Monitor Frame: EMF
  - 3. Infection Prevention Dispenser: EICD

#### **2.3 BROCHURE HOLDER**

- A. Design Basis: Peter Pepper Products "3-Pocket High Magazine and Literature Rack" Model 4033
  - 1. Wood Parts: Natural Maple.
  - 2. Metal Parts: Black.

#### **2.4 GLASS ENCLOSED BULLETING BOARD**

- A. Design Basis: Peter Pepper Products "Glass Enclose Bulletin Board" MMD-2-RA 3624
  - 1. Cork Color: #2187
  - 2. Edge Trim: Style "Lineal-1, Natural Maple.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Install as directed by product manufacturer.

--- END ---