

# **HANDICAP ACCESSIBLE UPDATES 100% SUBMITTAL - PROJECT MANUAL**

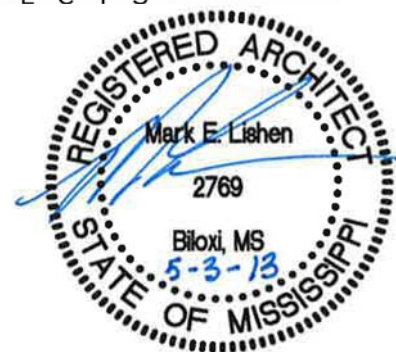
**REFERENCE SOLICITATION NO. VA256-12-R-0589 FOR HANDICAP  
ACCESSIBLE UPDATES BILOXI A/E FOR THE VA GULF COAST VETERANS  
HEALTH CARE SYSTEM, BILOXI, MS  
PROJECT NO. 520-08-114  
MAY 3, 2013**



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**DEPARTMENT OF VETERANS AFFAIRS  
VHA MASTER SPECIFICATIONS**

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**SECTION 01 00 10**  
**GENERAL REQUIREMENTS**

**1.1 GENERAL INTENTION**

- A. Contractor shall completely prepare site for building and renovations, including demolition and removal of existing structures, and furnish labor and materials and perform work for renovations to existing structures and site elements as required by the drawings and specifications.
- B. 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.
- C. 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.
- D. Training:
  - 1. All employees of the general contractor or subcontractors working on site shall have completed the 10-hour OSHA certified Construction Safety course and/or other relevant competency training, as determined by the VA Competent Person (CP) with input from the Infection Control Risk Assessment (ICRA) team. The VA CP shall be the same person appointed as Contracting Officer's Technical Representative (COTR). The contractor's project supervisor and the contractor's competent person (CP) referred to in paragraph "C" above shall have completed the 30-hour OSHA certified Construction Safety course
  - 2. Proof that the contractor's supervisor and CP have completed the 30-hour OSHA certified Construction Safety course shall be submitted for approval before the start of work. Contractor's certification that all other employees working under this project have completed the 10-hour OSHA certified Construction Safety course will be required prior to issuance of the Notice to Proceed.

**1.2 STATEMENT OF BID ITEM(S)**

ITEM I, GENERAL CONSTRUCTION: Furnish all labor, tools, materials, equipment, transportation, and supervision necessary to perform all work associated with the following renovations

for Project No. 520-08-114, Handicap Accessible Updates, throughout the campus as required by the drawings and specifications. All work to be performed at VA Gulf Coast Veterans Health Care System, Biloxi, Mississippi.

### **1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

- A. AFTER AWARD OF CONTRACT, one (1) set of specifications and drawings will be furnished.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense.

### **1.4 CONSTRUCTION SECURITY REQUIREMENTS**

#### **A. Security Plan:**

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

#### **B. Contractor Personnel**

- 1. Upon receipt of the Notice to Proceed, the General Contractor shall provide information about every employee including that of all sub-contractors who will need access to construction site.
- 2. This information shall include employee's full name, social security number, date and place of birth, citizenship and visa status where applicable.
- 3. Every employee of the General Contractor or sub-contractor shall have to go through a security screening to determine their suitability for access to VA facilities. VA will use two different screening processes.
- 4. Those requiring access to VA-designated sensitive information and management responsibilities will have a more strict background check including their credit check. A general police check will be required for all other employees:
  - a. Conviction of tax evasion may disqualify any one for working in sensitive position.

- b. Act of violence; arrest for firearms; illegal alien status or any felony conviction or possession of explosives will disqualify any person for working on any VA construction project.
- 5. Each employee shall be furnished with a badge by VA for access to construction site. This badge must be worn so as to be clearly visible at all times while on the work site.
- 6. Access to other parts of the VA property will be subject to the screening procedures applicable to visitors under the Alert Level in effect as determined by the Department of Homeland Security.
- 7. All employees working on the construction project shall be required to execute a Department of Veterans Affairs Confidentiality Non-Disclosure Certification.

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. Key Control:

- 1. The General Contractor shall provide duplicate keys and lock combinations to the Project 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.

#### 1.5 FIRE SAFETY

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

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

E84-2007 .....Surface Burning Characteristics of  
Building Materials

2. National Fire Protection Association (NFPA):

10-2006 .....Standard for Portable Fire  
Extinguishers

30-2003 .....Flammable and Combustible Liquids Code

51B-2003 .....Standard for Fire Prevention During  
Welding, Cutting and Other Hot Work

70-2005 .....National Electrical Code

241-2004 .....Standard for Safeguarding Construction,  
Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

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

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to 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:  
  
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 07270, FIRESTOPPING SYSTEMS.
- F. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Project Engineer and facility Safety Officer.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Project Engineer 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.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions and coordinate with Project Engineer 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.

- L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Project Engineer and facility Safety Officer.
- M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Engineer to obtain permits from Work Order.
- N. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly.
- O. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- Q. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

#### **1.6 OPERATIONS AND STORAGE AREAS**

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

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

D. 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.

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

E. 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.

F. 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.
2. Method and scheduling of required cutting, altering and removal of existing roads; walks and entrances must be approved by the Resident Engineer.
3. Contractor shall provide temporary means of access to any accessible way interrupted by construction activities for all roads, walks, entrances, and parking areas being altered in this contract. Temporary access provided must be of firm stable flat material to allow wheelchair access. Provide temporary wood handrails at accessible

ways where existing handrails have been removed until railings can be replaced per the contract.

- G. 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.

#### **1.7 ALTERATIONS**

Contractor shall not damage existing finishes unless work under this contract requires. Should existing finishes be altered for any reason, contractor shall be responsible for repairs and shall match existing finishes.

#### **1.8 INFECTION PREVENTION MEASURES**

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- C. 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. Contractor is required to 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 temporary construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic

barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center.

- b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.
- c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
- d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as they are created. Transport these outside the construction area in containers with tightly fitting lids.
- e. The contractor shall not haul debris through patient-care areas without prior approval of the 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.

D. Final Cleanup:

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

## 1.9 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) of Section 01001, GENERAL CONDITIONS.

#### **1.10 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 two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

#### **1.11 AVAILABILITY AND USE OF UTILITY SERVICES**

The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies. Any utility not available at the job site shall be furnished by the contractor.

#### **1.12 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.

### **1.13 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.

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

**PART 1- GENERAL**

**1.1 DESCRIPTION:**

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

**1.2 CONTRACTOR'S REPRESENTATIVE:**

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

**1.3 COMPUTER PRODUCED SCHEDULES**

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

- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

#### **1.4 THE COMPLETE PROJECT SCHEDULE SUBMITTAL**

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These

changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- D. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
  - 1. Notify the Contractor concerning his actions, opinions, and objections.
  - 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

#### **1.5 WORK ACTIVITY/EVENT COST DATA**

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER

FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).

- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

#### 1.6 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
  - 1. Show activities/events as:
    - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
    - b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
    - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
    - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
    - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
  - 2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
  - 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to

- non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
  5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
  2. The planned number of shifts per day.
  3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COTR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

#### **1.7 PAYMENT TO THE CONTRACTOR:**

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall

be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.

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

#### **1.8 PAYMENT AND PROGRESS REPORTING**

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
  - 1. Actual start and/or finish dates for updated/completed activities/events.
  - 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
  - 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
  - 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
  - 5. Completion percentage for all completed and partially completed activities/events.
  - 6. Logic and duration revisions required by this section of the specifications.
  - 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule

logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

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

#### **1.9 RESPONSIBILITY FOR COMPLETION**

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:



1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
  2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
  3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

#### **1.10 CHANGES TO THE SCHEDULE**

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
  2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
  3. The schedule does not represent the actual prosecution and progress of the project.
  4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of

this section and any other previous agreements by the Contracting Officer or the VA representative.

- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

#### **1.11 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question

and its relationship to other activities on the approved network diagram.

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

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

- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
  - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.
- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant

to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
  - A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
  - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
    1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
    2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
    3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

- C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
  2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
  3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
  4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
  5. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
  6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
  7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are

not requested for return by Contractor will be discarded after completion of contract.

- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
  2. Reproducible shall be full size.
  3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
  4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
  5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
  6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
  7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to

Eley Guild Hardy Architects, P.A.  
1091 Tommy Munro Drive  
Biloxi, MS 39532

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

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**SECTION 01 42 19**  
**REFERENCE STANDARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

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

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

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

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

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

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



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

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

AA	Aluminum Association Inc. <a href="http://www.aluminum.org">http://www.aluminum.org</a>
AAMA	American Architectural Manufacturer's Association <a href="http://www.aamanet.org">http://www.aamanet.org</a>
AASHTO	American Association of State Highway and Transportation Officials <a href="http://www.aashto.org">http://www.aashto.org</a>
ACI	American Concrete Institute <a href="http://www.aci-int.net">http://www.aci-int.net</a>
AGC	Associated General Contractors of America <a href="http://www.agc.org">http://www.agc.org</a>
AISC	American Institute of Steel Construction <a href="http://www.aisc.org">http://www.aisc.org</a>
AISI	American Iron and Steel Institute <a href="http://www.steel.org">http://www.steel.org</a>
ANSI	American National Standards Institute, Inc. <a href="http://www.ansi.org">http://www.ansi.org</a>
ASCE	American Society of Civil Engineers <a href="http://www.asce.org">http://www.asce.org</a>
ASTM	American Society for Testing and Materials <a href="http://www.astm.org">http://www.astm.org</a>
AWS	American Welding Society <a href="http://www.aws.org">http://www.aws.org</a>
CLFMI	Chain Link Fence Manufacturers Institute <a href="http://www.chainlinkinfo.org">http://www.chainlinkinfo.org</a>

CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">http://www.crsi.org</a>
EPA	Environmental Protection Agency <a href="http://www.epa.gov">http://www.epa.gov</a>
FPS	The Forest Products Society <a href="http://www.forestprod.org">http://www.forestprod.org</a>
FM	Factory Mutual Insurance <a href="http://www.fmglobal.com">http://www.fmglobal.com</a>
GSA	General Services Administration <a href="http://www.gsa.gov">http://www.gsa.gov</a>
ICBO	International Conference of Building Officials <a href="http://www.icbo.org">http://www.icbo.org</a>
IMSA	International Municipal Signal Association <a href="http://www.imsasafety.org">http://www.imsasafety.org</a>
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://www.naamm.org">http://www.naamm.org</a>
NFPA	National Fire Protection Association <a href="http://www.nfpa.org">http://www.nfpa.org</a>
OSHA	Occupational Safety and Health Administration Department of Labor <a href="http://www.osha.gov">http://www.osha.gov</a>
PCA	Portland Cement Association <a href="http://www.portcement.org">http://www.portcement.org</a>
SSPC	The Society for Protective Coatings <a href="http://www.sspc.org">http://www.sspc.org</a>
UBC	The Uniform Building Code See ICBO
UL	Underwriters' Laboratories Incorporated <a href="http://www.ul.com">http://www.ul.com</a>

Handicap Accessible Updates (520-08-114)

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**SECTION 01 45 29**  
**TESTING LABORATORY SERVICES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by Department of Veterans.

**1.2 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 listed in the technical sections of the specifications. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Resident Engineer immediately of any irregularity.

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

**PART 3 - EXECUTION**

**3.1 EARTHWORK:**

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule

and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Resident Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Resident Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
2. Provide part time observation of fill placement and compaction and field density testing in building areas and provide 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. Test fill in accordance with ASTM C 136 for conformance to ASTM C 33, ASTM D 2419, and ASTM D 2487 gradation limits. Test fill for material finer than the No. 200 sieve in accordance with ASTM D 1140. Test fill for liquid limit in accordance with ASTM D 4318 and for plasticity index in accordance with ASTM D 4318. Test fill materials for moisture density relations in accordance with ASTM D 1557. Perform one of each of the required tests for each material used when directed. Provide additional tests as specified above for each source change. Perform density tests in randomly selected locations and in accordance with ASTM D 1556, ASTM D 2922 and ASTM D 3017 as follows: One test per 2,500 square feet in each layer of lift and for each 1,000 square feet of subgrade in cut areas. Determine moisture content of soil material in place in accordance with ASTM D 3017 at every location where in-place density is tested. Where ASTM D 2922 and ASTM D 3017 is used to test field compaction densities, verify the results of the tests by performing at least one test per day using ASTM D 1556 at a location already tested by ASTM D 2922 and at least one additional test using ASTM D 1556 for every ten tests performed with a nuclear device, also at locations already checked by ASTM D 2922.

2. 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.

### **3.2 SITE WORK CONCRETE:**

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

### **3.3 CONCRETE:**

#### **A. 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. 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.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete. Test the first truck and each time cylinders are made.

8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
  9. Verify that specified mixing has been accomplished.
  10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
    - a. When ambient air temperature falls below 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.
- C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as

- directed by Resident Engineer. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
  3. Furnish certified compression test reports (duplicate) to Resident Engineer. In test report, indicate the following information:
    - a. Cylinder identification number and date cast.
    - b. Specific location at which test samples were taken.
    - c. Type of concrete, slump, and percent air.
    - d. Compressive strength of concrete in MPa (psi).
    - e. Weight of lightweight structural concrete in kg/m<sup>3</sup> (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.

### **3.4 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.

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

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

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

7. Sanitary Wastes:

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

**1.2 QUALITY CONTROL**

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

**1.3 SUBMITTALS**

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

wildlife, soil, historical, and archeological and cultural resources.

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

#### **1.4 PROTECTION OF ENVIRONMENTAL RESOURCES**

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

- protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
    - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
    - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
    - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
  3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
  4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
    - a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
    - b. Reuse or conserve the collected topsoil sediment as directed by the Resident Engineer. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
    - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
  5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features on the Environmental Protection Plan. Maintain temporary erosion and

sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.

6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
  7. Manage and control spoil areas on Government property to limit spoil to areas on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby water courses or lakes.
  8. Protect adjacent areas from despoilment by temporary excavations and embankments.
  9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
  10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
  11. Handle discarded materials other than those included in the solid waste category as directed by the Resident Engineer.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
  2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
  3. Monitor water areas affected by construction.
- D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Mississippi and Federal emission and performance laws and standards. Maintain ambient air quality standards

set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
  2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
  3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
  4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Resident Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the Resident Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

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

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

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

- b. Use shields or other physical barriers to restrict noise transmission.
  - c. Provide soundproof housings or enclosures for noise-producing machinery.
  - d. Use efficient silencers on equipment air intakes.
  - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
  - f. Line hoppers and storage bins with sound deadening material.
  - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
- F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the 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 74 19**  
**CONSTRUCTION WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

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

**1.2 RELATED WORK**

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.



### 1.3 QUALITY ASSURANCE

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

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

#### **1.4 TERMINOLOGY**

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

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

#### **1.5 SUBMITTALS**

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

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

#### **1.7 RECORDS**

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.

- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

### **PART 3 - EXECUTION**

#### **3.1 COLLECTION**

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

#### **3.2 DISPOSAL**

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

#### **3.3 REPORT**

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

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**SECTION 02 41 00**  
**DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies demolition and removal of concrete sidewalks, ramps, asphalt, metal handrails, and other structures and debris as shown on drawings.

**1.2 RELATED WORK:**

- A. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- D. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.

**1.3 PROTECTION:**

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

1. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
  2. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Resident Engineer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Resident Engineer's approval.
- G. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

#### **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. Debris, including concrete, asphalt, 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. Contractor shall dispose debris in

compliance with applicable federal, state or local permits, rules and/or regulations.

- B. 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.
- C. Concrete Sidewalks and Paving: Sawcut existing concrete sidewalks indicated to be removed full depth along removal limits. Sawcut shall be performed at the nearest existing control joint.
  - 1. Edges of sawcuts shall be protected and shall be neat and square.
  - 2. Break up and remove concrete full depth. Remove existing aggregate or granular base course to the top of existing subgrade.
  - 3. Subgrade preparation shall be per 32 05 23 - CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. Section "Concrete Pavements".
  - 4. Remove material from Medical Center property.

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

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

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**SECTION 03 53 00**  
**EXTERIOR SELF-LEVELING CONCRETE TOPPING**

**PART 1 - GENERAL**

**1.1 SUMMARY:**

- A. This Section includes the self-leveling, portland cement-based topping for fast track resurfacing for exterior applications over concrete.

**1.2 SUBMITTALS:**

- A. Product Data: For each type of product indicated.

**1.3 QUALITY ASSURANCE:**

- A. Installation must be by an applicator using mixing equipment and tools approved by the manufacturer.
- B. Topping material shall achieve compressive strength of 4300 psi after 28 days per ASTM C109/modified (air-cure only).
- C. Topping shall be able to be installed from 1/4" to 3/4" in one pour, and up to 2" with the addition of an appropriate aggregate.
- D. The surface shall be suitable to receive all types of wear surfaces or sealers when allowed to properly dry in accordance with the manufacturer's recommendations
- E. Topping shall be walkable after 2 to 3 hours, and able to be coated with a traditional wear protection coating after 24 hours.

**1.4 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver materials in their unopened packages and protect from extreme temperatures and moisture. Protect liquids from freezing.

**1.5 PROJECT/SITE CONDITIONS:**

- A. Do not install below 50°F or over 90°F surface and air temperatures. Do not install if rain is expected within 6 to 8 hours, or if freezing temperatures are expected within 24 hours.
- B. Never mix with cement or additives other than manufacturer approved products.
- C. The topping must be coated with a wear protection coating suitable for the intended use.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS:**

- A. Ardex Engineered Cements
- B. Equal as approved

**2.2 MATERIALS:**

- A. Provide Portland cement based topping "Ardex K301".
  - 1. Primer: Ardex EP 2000.
  - 2. To fill dormant cracks, the epoxy material shall be Metzger & McGuire MM-80 or approved equal.
  - 3. The sand broadcast into the fresh ARDEX EP 2000 shall be fine sand that is less than 1/50 of an inch in grain size, or 98.5% passing sieve size #35.
  - 4. Aggregate shall be well-graded, washed gravel (1/8" to 1/4" or larger) for use in pre-leveling or when the material is installed over 3/4" thick.

- B. Water shall be clean, potable and sufficiently cool (not warmer than 70°F).
- C. Wear surface: the finished topping surface shall be coated with a resin-based wear protection system ARDEX CG.

### **2.3 MIX DESIGNS:**

- A. Mixing Ratio: The cementitious topping shall be mixed two bags at a time. Mix each bag of the powder with the specified amount of water in an mixing drum using an manufacturer's approved mixing paddle and a 1/2" heavy-duty drill (min. 650 rpm). Mix thoroughly for 2-3 minutes to obtain a lump-free mixture. Follow written instructions on the manufacturer's product bag label.
- B. Aggregate mix: For pre-leveling and areas to be installed from 3/4" - 2" thick, aggregate shall be added. Mix the powder with water first, and then add from 1/3 up to 1 part by volume of aggregate (1/8" to 1/4" or larger). Do not use sand. The addition of aggregate will diminish the workability of the product, and may make it necessary to install a finish layer. Allow the first layer to dry for 24 hours before priming and installing a neat coat of Ardex K 301 after.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION:**

- A. All subfloors must be sound, solid, cleaned and primed:
  - 1. All concrete substrates must be of adequate strength, clean and free of all oil, grease, dirt, curing compounds and any substance that might act as a bondbreaker before priming. Over watered, frozen or otherwise weak concrete surfaces must also be cleaned down to sound, solid concrete by mechanical methods. All substrates must be mechanically roughened to a minimum ICRI surface profile of 3 (CSP #3). Acid etching, sweeping compounds and solvents are not acceptable.
  - 2. For the treatment of cracks, the use of a two-part epoxy and joint filler shall be used. Use the epoxy to fill non-moving (dormant) cracks in existing concrete surfaces. Cracks greater than a hairline in width (1/32") must be filled with epoxy filler in strict accordance with the installation instructions provided by the epoxy manufacturer.
- B. Joint Preparation:
  - 1. Moving Joints - honor all expansion, isolation and construction joints up through the topping.
  - 2. Saw Cuts and Control Joints - fill all non-moving joints with epoxy filler as stated above.

### **3.2 APPLICATION:**

- A. Priming:
  - 1. For areas to receive topping, apply freshly mixed primer to the prepared surface using a short-nap paint roller. For particularly rough substrates, use a longer nap roller. Primer can also be applied with a paintbrush in hard-to-reach areas and corners.
  - 2. While in a fresh state, broadcast an excess of fine sand ("play sand" that is less than 1/50 of an inch in grain size) consistently over the entire area. Figure about 2/3 lb. of sand per square foot of area. Avoid all traffic over the surface for a minimum of 6 hours.

3. After 16 hours, broom sweep and vacuum the surface to remove all loose sand.
- B. Topping:
1. Pour the liquid topping, spread in place, and immediately smooth with manufacturers approved tools. Wear baseball shoes with non-metallic cleats to avoid leaving marks in the liquid topping. The topping can be walked on in 2-3 hours.
- C. Sealing:
1. Waterborne sealer is to be applied at a thickness not-to-exceed a total of 20 mils. The coating shall be applied after the topping has cured for a minimum of 24 hours.

END OF SECTION

**SECTION 03 92 50**

**REPAIR MORTARS**

**PART 1 - GENERAL**

**1.1 SUMMARY:**

- A. This Section includes Portland cement-based, polymer modified structural repair mortar with integral corrosion inhibitor.

**1.2 SUBMITTALS:**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Material Safety Data Sheets.

**1.3 QUALITY ASSURANCE:**

- A. Installation must be by an applicator using mixing equipment and tools approved by the manufacturer.

**1.4 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver materials in their unopened packages and protect from extreme temperatures and moisture. Protect liquids from freezing.

**1.5 PROJECT/SITE CONDITIONS:**

- A. Do not install below 50°F or over 90°F surface and air temperatures. Do not install if rain is expected within 6 to 8 hours, or if freezing temperatures are expected within 24 hours.
- B. Never mix with cement or additives other than manufacturer approved products.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS:**

- A. Ardex Engineered Cements
- B. Equal as approved

## **2.2 MATERIALS:**

- A. Single-component, polymer-modified, Portland cement-based structural repair mortar, with integral corrosion inhibitors suitable for exterior and interior horizontal applications above, on or below grade.
  - 1. Provide equal to Ardex "ERM".
- B. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F (23° C) and 50 percent relative humidity:
  - 1. Application: Trowel.
  - 2. Working Time: 25 - 45 minutes.
  - 3. Compressive Strength: 7,000 psi (48.3MPa) at 7 days, 8200 psi (56.58 MPa) at 28 days, ASTM C109.
  - 4. Flexural Strength: 1,200 psi (8.3 MPa) at 7 days, 1,500 psi (10.3 MPa) at 28 days, ASTM C293.
  - 5. Modulus of Elasticity in Compression:  $3.67 \times 10^6$  psi at 28 days, ASTM C469, modified.
  - 6. Shrinkage: less than 0.06% at 7 days, less than 0.08% at 28 days, ASTM C157, air cured.
  - 7. Rapid Chloride Permeability: 820 Coulombs, at 28 days, ASTM C1202.
  - 8. Low -slump, non-sagging.
  - 9. Color: Concrete gray.
  - 10. Combustibility: Non-combustible, both before and after use.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION:**

- A. All subfloors must be sound, solid, cleaned and primed:

General: Prepare substrate in accordance with manufacturer's instructions. Prior to proceeding with any repair, please refer to the International Concrete Repair Institute's ICRI 03730 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion; ICRI 03732 Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays; and the American Concrete Institute's ACI 546R-04 Concrete Repair Guide for general guidelines for concrete repair.

1. All concrete and masonry substrates must be sound, solid, dry, and completely free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker. Overwatered, frozen or otherwise weak concrete surfaces must also be cleaned down to sound, solid concrete by mechanical methods such as scarifying, scabbling or similar in accordance with ICRI 03732 before priming. Acid etching and the use of sweeping compounds and solvents are not acceptable.

2. The repair area must be saw cut in a basic rectangular shape at least 1/4" (6 mm) in depth. The cuts should be made at 90° angle, and should be slightly keyed. Chip out the concrete inside the cuts to a minimum depth of 1/4" (6 mm) until the area is squared or box shape.
3. Mechanically prepare surface to obtain an exposed aggregate surface with a minimum surface profile of approximately 1/16" (1.5 mm).

**3.2 APPLICATION:**

A. Priming:

END OF SECTION

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

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

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

**1.2 RELATED WORK:**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- C. Concrete topping: Section 03 53 00, EXTERIOR SELF-LEVELING CONCRETE TOPPING.

**1.3 TOLERANCES:**

- A. ACI 117.
- B. Slab Finishes: ACI 117, F-number method in accordance with ASTM E1155.

**1.4 REGULATORY REQUIREMENTS:**

- A. ACI SP-66 ACI Detailing Manual
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Concrete Mix Design.
- C. Shop Drawings: Reinforcing steel: Complete shop drawings.
- D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds.

**PART 2 - PRODUCTS**

**2.1 FORMS:**

Wood, plywood, metal, or other materials, approved by Resident Engineer, of grade or type suitable to obtain type of finish specified.

## **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, Size 67. Size 467 may be used for footings and walls over 300 mm (12 inches) thick. Coarse aggregate for applied topping and metal pan stair fill shall be Size 7.
- D. Fine Aggregate: ASTM C33.
- E. Lightweight Aggregate for Structural Concrete: ASTM C330, Table 1
- F. Mixing Water: Fresh, clean, and potable.
- G. Air-Entraining Admixture: ASTM C260.
- H. Chemical Admixtures: ASTM C494.
- I. Vapor Barrier: ASTM D4397, 0.25 mm (10 mil).
- J. Reinforcing Steel: ASTM A615 or ASTM A996, deformed. See structural drawings for grade.
- K. Welded Wire Fabric: ASTM A185.
- L. Expansion Joint Filler: ASTM D1751.
- M. Sheet Materials for Curing Concrete: ASTM C171.
- N. Abrasive Aggregates: Aluminum oxide grains or emery grits.
- O. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

## **2.3 CONCRETE MIXES:**

- A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.
- B. Compressive strength at 28 days shall be not less than 30 Mpa (4000 psi). Exterior concrete may be 25 Mpa (3000 psi).
- C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
- D. Maximum slump for vibrated concrete is 100 mm (4 inches) tested in accordance with ASTM C143.
- E. Cement and water factor (See Table I):



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

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/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
30 (4000) <sup>1</sup>	325 (550)	0.55	340 (570)	0.50
25 (3000) <sup>1</sup>	280 (470)	0.65	290 (490)	0.55

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.

F. Air-entrainment is required for all exterior concrete and as required for Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. Air content shall conform with the following table:

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

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10 mm (3/8 in)	6 to 10
13 mm (1/2 in)	5 to 9
19 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

#### **2.4 BATCHING & MIXING:**

A. Store, batch, and mix materials as specified in ASTM C94.

1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.
2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.

## **PART 3 - EXECUTION**

### **3.1 FORMWORK:**

- A. Installation conform to ACI 347. Sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.
- 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. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges 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.
- D. Construction Tolerances:
  - 1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. 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 REINFORCEMENT:**

Details of concrete reinforcement, unless otherwise shown, in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

### **3.3 VAPOR BARRIER:**

- A. Place interior concrete slabs on a continuous vapor barrier.
- B. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
- C. Lap joints 150 mm (6 inches) and seal with a compatible pressure-sensitive tape.
- D. Patch punctures and tears.

### **3.4 PLACING CONCRETE:**

- A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of Resident Engineer before placing concrete. Provide screeds at required elevations for concrete slabs.
- B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.
- C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.
- D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.
- E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium

chloride shall not be permitted without written approval from Resident Engineer.

**3.5 PROTECTION AND CURING:**

Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Resident Engineer.

**3.6 FORM REMOVAL:**

Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

**3.7 SURFACE PREPARATION:**

Immediately after forms have been removed and work has been examined and approved by Resident Engineer, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part portland cement and 2 to 3 parts sand.

**3.8 FINISHES:**

A. Vertical Surface Finishes:

1. Unfinished Areas: Vertical concrete surfaces exposed in unfinished areas, and other unfinished areas exposed or concealed will not require additional finishing.
2. Exterior Exposed Areas (finished): Finished areas, unless otherwise shown, shall be given a grout finish of uniform color and shall have a smooth finish treated as follows:
  - a. After concrete has hardened and laitance, fins and burrs have been removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone or stone.
  - b. Apply grout composed of 1 part portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
  - c. After grout has hardened, but still plastic, remove surplus grout with a sponge rubber float and by rubbing with clean burlap.
  - d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish for any area in same day. Confine

limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

**B. Slab Finishes:**

1. Scratch Finish: Slab surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within 2 hours after placing) to roughen surface to insure a permanent bond between base slab and applied cementitious materials.
2. Floating: Allow water brought to surface by float used for rough finishing to evaporate before surface is again floated or troweled. Do not sprinkle dry cement on surface to absorb water.
3. Float Finish: Ramps, stair treads, and platforms, and slabs to receive non-cementitious materials, except as specified, shall be screened and floated to a smooth dense finish. After first floating, while surface is still soft, surfaces shall be checked for alignment using a straightedge or template. Correct high spots by cutting down with a trowel or similar tool and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat the slab to a uniform sandy texture.
4. Steel Trowel Finish: all monolithic concrete floor slabs exposed in finished work shall be steel troweled. Final steel troweling to secure a smooth, dense surface shall be delayed as long as possible, generally when the surface can no longer be dented with finger. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure on trowel to compact cement paste and form a dense, smooth surface. Finished surface shall be free of trowel marks, uniform in texture and appearance.
5. Broom Finish: Finish all exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after the surfaces have been floated.

**3.9 SURFACE TREATMENTS:**

- A. Surface treatments shall be mixed and applied in accordance with manufacturer's printed instructions.
- B. Non-Slip Finish: apply non-slip abrasive aggregate to platforms of all concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Aggregate shall be broadcast uniformly over concrete surface. Trowel concrete surface to smooth dense finish. After curing,

rub the treated surface with abrasive brick and water sufficiently to slightly expose abrasive aggregate.

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**SECTION 04 05 16**  
**MASONRY GROUTING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

Section specifies grout materials and mixes.

**1.2 RELATED WORK:**

- A. Grout used in Section:
  - 1. Section 04 20 00, UNIT MASONRY.

**1.3 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
  - 1. Indicating that following items meet specifications:
    - a. Portland cement.
    - b. Masonry cement.
    - c. Grout.
    - d. Hydrated lime.
    - e. Fine aggregate (sand).
    - f. Coarse aggregate for grout.
- C. Manufacturer's Literature and Data:
  - 1. Cement, each kind.
  - 2. Hydrated lime.
  - 3. Admixtures.

**1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:**

- A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.
- B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

**PART 2 - PRODUCTS**

**2.1 HYDRATED LIME:**

ASTM C207, Type S.

**2.2 AGGREGATE FOR MASONRY GROUT:**

ASTM C404, Size 8.

**2.3 BLENDED HYDRAULIC CEMENT:**

ASTM C595, Type IS, IP.

**2.4 MASONRY CEMENT:**

A. ASTM C91. Type N, S, or M.

**2.5 PORTLAND CEMENT:**

A. ASTM C150, Type I.

**2.6 WATER:**

Potable, free of substances that are detrimental to grout, masonry, and metal.

**2.7 GROUT:**

- A. Conform to ASTM C476 except as specified.
- B. Grout type proportioned by volume as follows:
  - 1. Coarse Grout:
    - a. Portland cement or blended hydraulic cement: one part.
    - b. Hydrated lime: 0 to 1/10 part.
    - c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
    - d. Coarse aggregate: one to two times sum of volumes of cement and lime used.
  - 3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

**PART 3 - EXECUTION**

**3.1 MIXING:**

- A. Mix in a mechanically operated grout mixer.
  - 1. Mix grout for at least five minutes.
- B. Measure ingredients by volume. Measure by the use of a container of known capacity.
- C. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.



**3.2 GROUT USE LOCATIONS:**

- A. Use coarse grout for filling wall cavities and cells of concrete masonry units.
- B. Do not use grout for filling bond beam or lintel units.

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**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
  - 1. Safety Nosings

**1.2 RELATED WORK**

- A. Railings at new work: Section 05 73 23, ORNAMENTAL RAILINGS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Safety nosing
- C. Shop Drawings:
  - 1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
  - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
  - 3. Provide templates and rough-in measurements as required.
- D. 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 construction.

**1.4 QUALITY ASSURANCE**

- A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type shall be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.

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

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Stainless Steel: ASTM A167, Type 316.
- B. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.

### **2.2 HARDWARE**

- A. Fasteners at safety nosing: 316 stainless steel standard and tread plate securing screws.

### **2.3 FABRICATION GENERAL**

- A. Safety Nosing:
  - 1. Fabricate stair nosing assemblies as detailed. Provide anchors and accessories necessary for complete installation.
- B. Finish:
  - 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
  - 2. Aluminum: NAAMM AMP 501.
    - a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
  - 3. Color of abrasive ribs shall be black.
- C. Protection:
  - 1. Insulate aluminum surfaces that will come in contact with concrete, or metals other than stainless steel by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.

### **2.4 SAFETY NOSINGS**

- A. Two component stair nosing, equal to "Model No. DST-330" as manufactured by Balco Inc.
- B. 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.
- C. Fabricate nosings to extend within 100 mm (4 inches) of ends of concrete stair treads except where shown to extend full width.

**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.
  - 1. Provide temporary bracing for such items until concrete is set.
  - 2. Place in accordance with setting drawings and instructions.
- C. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

**3.2 SAFETY NOSINGS**

- A. Install safety nosings at the following:
  - 1. 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.

**3.3 CLEAN AND ADJUSTING**

- A. Clean after installation exposed prefinished items as recommended by the metal manufacture and protected from damage until completion of the project.

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**SECTION 05 73 23**  
**ORNAMENTAL RAILINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Welded type aluminum handrails and guardrails, including system required accessories for a complete installation.

**1.2 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Engineer, fabricate, and install handrails, guardrails, and railing systems to withstand the structural loading required by applicable codes.
- B. Thermal and Corrosion Control:
  - 1. Allow for thermal action resulting from the maximum range (change) in ambient temperature in the design, fabrication, and installation of rail systems, to prevent opening of joints, buckling, and other detrimental effects, including overstressing of connections and components.
  - 2. Prevent galvanic action and other forms of corrosion by isolating dissimilar metals, preventing direct contact with each other.

**1.3 SUBMITTALS**

- A. Product Data: Manufacturer's specifications and installation instructions for all components of each product type specified.
- B. Shop Drawings: Prepared specifically for this project.
  - 1. Show complete layout; plan views, elevations, expansion joints, connections, details for fabrication and attachment to other elements, and other installation details.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer/Installer Qualifications: Provide handrails, guardrails, and railing systems from one source, produced by a manufacturer and craftsmen having resources to provide consistent quality in appearance and physical properties, without delaying the work.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver handrails, guardrails, railing systems, and related

components in protective packaging. Inspect materials to ensure that specified products have been received.

- B. Store components to avoid damage from moisture, abrasion, and other construction activities.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Moultrie Manufacturing Company
- B. Fluid Metalworks, Inc.
- C. Equal as approved.

### **2.2 MATERIALS**

- A. General: Provide material free from surface blemishes where exposed to view in the finished installation.
- B. Aluminum: Alloy 6105T5 and T1/ 6005-T5 and T1
  - 1. Extruded pipe: ASTM B 429.
  - 2. Bars, Rods and Tubes: ASTM B 221.
  - 3. Plate and Sheet: ASTM B 209.
- C. Base Flanges, Anchors, and Inserts:
  - 1. Manufacturer's standard machined socket bases from solid aluminum 6063 stock; no castings of any type allowed (die or sand).
  - 2. Anchors and inserts as required to support work specified, in accord with approved shop drawings.
- D. Base Flanges, Anchors and Inserts:
  - 1. Provide manufacturer's standard machined or cast base flanges.
  - 2. Provide all anchors and inserts required to support work specified, in accord with approved shop drawings.

### **2.3 MANUFACTURED UNITS**

- A. Provide "Federal" welded railing system and all related items, as supplied by Moultrie Manufacturing Company.

### **2.4 FABRICATION**

- A. Fabricate in design to dimensions indicated on Drawings. Provide expansion joints to accommodate thermal movement of system.
- B. Fabricate handrails and railing systems to comply with manufacturer's written requirements, requirements for Project design, details, dimensions, finish, and member sizes, including

post spacing and anchorage, but not less than the structural requirements to support loading.

1. Clearly mark component units for site assembly and installation. Use connections that maintain structural capacity of joined members.
2. Provide weep holes or other means to exit entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.

## **2.5 FINISHES**

A. Powder Coat Painted, at factory.

1. Color to be selected by Architect from manufacturer's standard array of colors.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine system components, substrate, and conditions where railing systems are to be installed.
- B. Notify architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Prepare surrounding construction to receive railing system installations to comply with manufacturer's requirements.
- B. Review and coordinate setting drawings, shop drawings, templates, and instructions for assembly and installation of railing system and related items to be embedded in concrete and masonry.

### **3.3 INSTALLATION**

- A. Install railing system and related components in strict accordance with manufacturer's written installation instructions and Project shop drawings.
- B. Preassemble railing system, including posts, in easy to lift sections whenever possible.
  1. Align rails so that variations from level for horizontal members, and from parallel with rake of steps and ramps, for sloping members do not exceed 1/8 inch in 12 feet.
  2. Where aluminum might come into contact with concrete, masonry

- or other metals, separate materials to prevent electrolytic action by means of an asphaltic paint or other approved method.
- C. Adjust, level and securely install railing system components.
    - 1. Avoid springing assembled components of system into place.
  - D. Install posts into concrete with pipe sleeves preset and anchored into concrete whenever possible, or by core drilling. After posts have been inserted, solidly fill the remaining space between post and side of sleeve or hole, with nonshrink nonmetallic grout to approximately  $\frac{1}{2}$  inch below exposed surface. Install appropriate waterproof sealant, as recommended by manufacturer, to slightly taper away from post.
  - E. Provide for water to drain from the railing system's hollow components by drilling weep holes at bottom locations or by providing other approved methods. Provide for thermal expansion / contraction by use of expansion joint / gap in top rails at maximum 20 foot intervals.
    - 1. Adhere strictly to manufacturer's instructions for locations of expansion joints and fastening of expansion sleeves.

#### **3.4 CLEANING**

- A. Immediately upon completion of installation, clean all railing system surfaces using clean water and mild soap or detergent.
- B. Do not use abrasive agent or harsh chemicals.

#### **3.5 PROTECTION**

- A. Provide adequate protection for all surfaces of completed installations to prevent damage during remainder of construction activities.

END OF SECTION



**SECTION 07 18 13**  
**PEDESTRIAN TRAFFIC COATINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies a surface applied elastomeric and composition waterproofing type membrane suitable for light pedestrian traffic and recreation areas, but not intended for heavy industrial use.

**1.2 TEST AREA**

Before start of general application, apply the elastomeric coating as specified in a representative test area. The area shall be approximately 9 m<sup>2</sup> (100 square feet). The area to be covered by the coating shall include all site conditions such as flashings bases, corners and projections through the coating. Location of test area shall be determined by the Resident Engineer, and after approval, shall serve as an example for the remaining work.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data: Each material, indicating compliance with specification requirements.
- C. Samples: Each finish color on 100 by 200 mm (4 by 8 inch) substrate, layered to show each coat and finish.

**1.4 WARRANTY**

Warranty surfaces, where elastomeric coating has been applied, against leaks and other failures, over and above normal wear and failure of substrate, and subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the warranty period is two years.

**1.5 DELIVERY AND STORAGE**

- A. Deliver materials to the site in original sealed containers, clearly marked with manufacturer's name and brand, and type of material.
- B. Store materials in weathertight and dry storage facility. Protect from damage from handling, weather and construction operations before,

during and after installation. Store materials at temperatures and under conditions recommended by the manufacturer.

#### **1.6 ENVIRONMENTAL REQUIREMENTS**

Do not proceed with application of materials when ambient temperature is less or greater than that recommended by the coating material manufacturer.

#### **1.7 SAFETY REQUIREMENTS**

Keep products away from heat, sparks and flame. Do not permit use of spark-producing equipment during application of flammable products or where explosive fumes are present.

### **PART 2 - PRODUCTS**

#### **2.1 PRIMER**

Type required by the elastomeric coating manufacturer.

#### **2.2 ELASTOMERIC BASE AND TOP COAT**

Elastomeric base and top coat materials shall meet or exceed the following requirements:

Property	Test Method	Base Coat	Top Coat
Tensile Strength	ASTM D412	300 pounds per square inch	600 pounds per square inch
Elongation	ASTM D412	550 percent	200 percent
Hardness, Shore A	ASTM D2240	20	45
Peel Strength (on concrete)	ASTM C794	30 pounds, 100 percent cohesion	100 percent cohesion to base coat
Permeability	ASTM E96	12 metric perms	0.06 metric perms

#### **2.3 AGGREGATE**

Thoroughly washed, clean, medium grained sharp indigenous stone granules, graded between 1mm and 4mm in size, and having a hardness of 6.5 or greater on the Moh's scale.

## **PART 3 - EXECUTION**

### **3.1 SURFACE PREPARATION**

- A. Surfaces to be coated shall be clean and dry. Smooth rough spots and tool marks.
- B. Fill holes, depressions and cracks with fillers compatible with the coating material and recommended by the coating manufacturer.
- C. Subsurface imperfections that telegraph through the finish coating surface will not be accepted.

### **3.2 WORK COORDINATION**

To provide a watertight installation, coordinate this work with flashing and drains required to be installed before the coating work begins and be completed after the coating is in place.

### **3.3 APPLICATION**

- A. Prime all surfaces to receive elastomeric waterproofing materials as recommended by the products manufacturer.
- B. Where horizontal surfaces intersect vertical surfaces provide a sealant type fillet as recommended by the manufacturers.
- C. Apply elastomeric base coat at a rate that will ensure a dry film thickness of not less than 35 mils.
- D. Uniformly disperse aggregate topping at the rate of 0.5 Kg per m<sup>2</sup> (10 lbs/100 sq. ft.); inter-bond and vulcanize granules within the fluid elastomeric topping in accordance with manufacturer's instructions.
- E. Apply elastomeric top coat at a rate which will ensure a dry film thickness of 15 mils for the top coat and a total combined dry film thickness for the base and top coats of not less than 50 mils.
- F. Complete the base to a uniform established line as shown.

### **3.4 CLEANING**

Remove smears of elastomeric material from other work.

### **3.5 PROTECTION**

Protect the finished coating from traffic until the coating cures.

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**SECTION 07 92 00**  
**JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

**1.2 RELATED WORK:**

- A. Sealing of site work concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- B. Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY.

**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. VOC: Acrylic latex and Silicone sealants shall have less than 50g/l VOC content.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.
- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
  - 1. Caulking compound
  - 2. Primers
  - 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

**1.5 PROJECT CONDITIONS:**

A. Environmental Limitations:

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

B. Joint-Width Conditions:

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

C. Joint-Substrate Conditions:

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

**1.6 DELIVERY, HANDLING, AND STORAGE:**

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

**1.7 DEFINITIONS:**

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

**1.8 WARRANTY:**

- A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

- B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

## **PART 2 - PRODUCTS**

### **2.1 SEALANTS:**

- A. S-1:
1. ASTM C920, polyurethane or polysulfide.
  2. Type M.
  3. Class 25.
  4. Grade NS.
  5. Shore A hardness of 20-40
  6. Equal to BASF (Sonneborn) Sonolastic SL-2
  7. Provide at expansion joints in concrete paving
- B. S-2:
1. ASTM C920, polyurethane or polysulfide.
  2. Type M.
  3. Class 25.
  4. Grade P.
  5. Shore A hardness of 25-40.
  6. Equal to BASF (Sonneborn) Sonolastic SL-1.
  7. Provide at non-expansion joints in concrete paving
- C. S-6:
1. ASTM C920, modified silicone (silyl-terminated polyether sealant).
  2. Type S.
  3. Class: 50.
  4. Grade NS.
  5. Shore A hardness of 15-20.
  6. Minimum elongation of 1200 percent.
  7. Equal to Sonneborn, Sonolastic 150.
  8. Provide at exterior building joints
- D. S-9:
1. ASTM C920 silicone.
  2. Type S.
  3. Class 25.

4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.
7. Equal to GE Silicones Sanitary SCS1700
8. Provide at all plumbing fixtures

**2.2 CAULKING COMPOUND:**

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

**2.3 COLOR:**

- A. Sealants used with exposed masonry shall match color of mortar joints.
- B. Sealants used with unpainted concrete shall match color of adjacent concrete.
- C. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.
- D. Caulking shall be light gray or white, unless specified otherwise.

**2.4 JOINT SEALANT BACKING:**

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

where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

**2.5 FILLER:**

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

**2.6 PRIMER:**

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

**2.7 CLEANERS-NON POUROUS SURFACES:**

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

**PART 3 - EXECUTION**

**3.1 INSPECTION:**

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

**3.2 PREPARATIONS:**

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
  - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.



2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
  - a. Concrete.
  - b. Masonry.
3. Remove laitance and form-release agents from concrete.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
  1. Apply primer prior to installation of back-up rod or bond breaker tape.
  2. Use brush or other approved means that will reach all parts of joints.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

### **3.3 BACKING INSTALLATION:**

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

### **3.4 SEALANT DEPTHS AND GEOMETRY:**

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.

- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

### **3.5 INSTALLATION:**

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool joints to concave surface unless shown or specified otherwise.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.

- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

### **3.6 CLEANING:**

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

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**SECTION 09 24 00  
PORTLAND CEMENT PLASTERING**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

This section specifies lathing and Portland cement based plaster (stucco).

**1.2 TERMINOLOGY**

- A. Definitions and description of terms shall be in accordance with ASTM C11, C841, and C926 and as specified.
- B. Solid Backing or Solid Bases: Concrete or masonry, to which plaster is directly applied.

**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. Bonding compounds, including application instructions.
  - 3. Admixtures, including mixing and application instructions.

**1.5 PROJECT CONDITIONS**

- A. Exterior plaster shall not be applied when the ambient temperature is less than 4°C (40°F).
- B. Plaster shall not be applied to frozen surfaces or surfaces containing frost.
- C. Frozen materials shall not be used in the mix.
- D. Plaster coats shall be protected against freezing for a period of not less than 24 hours after application.

**PART 2 - PRODUCTS**

**2.1 ACCESSORIES FOR CEMENT PLASTER (STUCCO)**

- A. ASTM C841, except fabricate from zinc alloy.
- B. Control Joints: ASTM C841, zinc.

## **2.2 FASTENERS**

- A. Tie, wire, screws, clips, and other fasteners ASTM C841, except as otherwise specified.
- B. Expansion Shields: CID A-A-55615, of the Type and Class applicable.

## **2.3 CEMENT**

- A. Portland: ASTM C150, Type I.
- B. Masonry: ASTM C91. Lime where added, ASTM C207, Type S.
- C. White where required for white finish coat.

## **2.4 LIME**

- A. ASTM C206, Type S.
- B. ASTM C207, Type S.

## **2.5 AGGREGATES (SAND)**

- A. ASTM C897, graded as required to suit texture of finish specified.
- B. White where white finish coat is specified.

## **2.6 BONDING AGENT**

ASTM C932.

## **2.7 FACTORY PREPARED FINISH COAT FOR CEMENT PLASTER (STUCCO)**

- A. Factory prepared dry blend of materials, integrally colored, designed for exterior finish coat application.
- B. Pigments: ASTM C979, lime proof mineral oxide.
- C. Not more than 35 percent, by weight of all ingredients (cement, aggregate, hydrated lime, admixture and coloring pigment) shall pass a number 100 sieve.

## **2.8 ADMIXTURES**

Air Entrainment: ASTM C260.

## **PART 3 - EXECUTION**

### **3.1 METAL PLASTERING BASES (LATH) LOCATIONS**

- A. Where plaster is required on solid concrete or masonry bases, metal plastering bases are not required.

### **3.2 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. Casing Beads:
  - 1. Install casing beads where shown and at following locations where plaster terminates to provide finish trim.
  - 2. Where plaster terminates against non-plastered surfaces such as masonry, concrete, and wood.
  - 3. Where plaster terminates against trim of steel frames and trim of other materials and equipment, except where trim overlaps plaster.
  - 4. Around perimeter of openings except where edge is covered by flanges. Locate to conform to dimensions shown on shop drawings.
  - 5. Where plaster for new walls or furring (vertical or horizontal) terminates against existing construction.
  - 6. Both sides of expansion and control joints unless shown otherwise.
  - 7. Install casing bead at perimeter angles between walls and ceilings so as to provide floating angle (unrestrained) construction in accordance with ASTM C841.
- D. Control Joints:
  - 1. Where control joints are placed parallel to framing members, install joints within 100 mm (four inches) of the framing member.

### **3.4 SURFACE PREPARATION OF SOLID BASES**

- A. Surfaces that are to receive plaster shall be prepared and conditioned in accordance with ASTM C926, except as otherwise specified.
- B. New surfaces of masonry and concrete:
  - 1. Remove projections and clean concrete surface of form oil.
  - 2. Fill depressions, holes, cracks and similar voids flush with Portland cement plaster to provide substrate within the tolerance specified in ASTM C926.
  - 3. Use bonding agent.

### 3.5 PORTLAND CEMENT BASED PLASTER

- A. Provide portland cement based plaster where cement plaster (stucco) is shown and specified, and as follows:
  - 1. Two coat work may only be used over solid bases meeting the requirements of Paragraph, SURFACE PREPARATION OF SOLID BASES.
- B. Proportion, mix and apply plaster in accordance with ASTM C926, except as otherwise specified.
  - 1. Use air entrained plaster for all exterior work.
  - 2. Use coloring pigments for finish coat when integral color other than white is specified.
  - 3. Use white cement with white sand when white finish coat is specified.
  - 4. Factory prepared finish coat: Add water, mix, and apply as specified by manufacturer.
  - 5. Color:
    - a. Color shall be selected by Resident Engineer.
  - 6. Finish coat shall be sand float.

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**SECTION 09 91 00**  
**PAINTING**

**PART 1-GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies field painting.
- B. Section specifies prime coats which may be applied in shop under other sections.

**1.2 RELATED WORK**

- A. Shop prime painting of steel and ferrous metals: Division 08 - OPENINGS,
- B. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Asphalt and concrete pavement marking: Section 32 17 23, PAVEMENT MARKINGS.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:  
Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

**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).

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Interior/Exterior Latex Block Filler: MPI 4.
- B. Exterior Latex, Semi-Gloss (AE): MPI 11.
- C. Interior Latex Primer Sealer: MPI 50.
- D. Waterborne Galvanized Primer: MPI 134.
- E. Interior High Performance Latex, MPI Gloss Level 3 (LL): MPI 139.
- F. Exterior Water Based Light Industrial Coating, MPI Gloss Level 5: MPI 163

### **2.2 PAINT PROPERTIES**

- A. Use ready-mixed (including colors) paints.
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

### **2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE**

- A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
  1. 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.
  2. Asbestos: Materials shall not contain asbestos.



3. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
4. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
5. Use high performance acrylic paints in place of alkyd paints, where possible.

### **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. Do no exterior painting when it is windy and dusty.
  3. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
  4. 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. 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 masonry.

#### **B. Zinc-Coated (Galvanized) Metal:**

1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non- Cementitious Galvanized Primer) depending on finish coat compatibility.

#### **C. Masonry and Cement Board:**

1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.

### **3.3 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. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

### **3.4 APPLICATION**

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
- E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
- F. Apply by brush, roller or spray, except as otherwise specified.

### **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. Metals:
  - 1. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer).
- D. Concrete Masonry Units:
  - 1. MPI 4 (Block Filler) on interior surfaces.
  - 2. Prime exterior surface as specified for exterior finishes.
- E. Concrete Cement board Interior Surfaces of Ceilings and Walls:
  - 1. Use MPI 141 (Interior High Performance Latex (SG) MPI Gloss Level 5).

### **3.6 EXTERIOR FINISHES**

- A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Steel and Ferrous Metal:
  - 1. Apply two coats of MPI 163 (Exterior Water Based Light Industrial Coating), MPI Gloss Level 5.

### **3.7 INTERIOR FINISHES**

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
  - 1. Apply to exposed surfaces.

2. Galvanized Metal:

- a. Apply two coats of MPI 163 (Exterior Water Based Light Industrial Coating), MPI Gloss Level 5.

C. Masonry Walls:

1. Over MPI 4 (Interior/Exterior Latex Block Filler) on CMU surfaces.
2. Two coats of MPI 139 (Interior High Performance Latex, MPI Gloss level 3 (LL)).

D. Cement Board: Two coats of MPI 141 (Interior High Performance Latex (SG) MPI Gloss Level 5.

**3.9 PAINT COLOR**

A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

**3.11 BUILDING AND STRUCTURAL WORK FIELD PAINTING**

A. Painting and finishing of interior and exterior work except as specified under paragraph 3.11 B.

1. Painting and finishing of new work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.

B. Building and Structural Work not Painted:

1. Prefinished items:

- a. Factory finished equipment such as metal roof panels.

2. Finished surfaces:

- a. Hardware except ferrous metal.
- b. Anodized aluminum, stainless steel, and chromium plating, except as otherwise specified.
- c. Signs, fixtures, and other similar items integrally finished.

3. Metal safety treads and nosings.

4. Gaskets.

5. Concrete curbs, gutters, and pavements.

**3.14 PROTECTION CLEAN UP, AND TOUCH-UP**

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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**SECTION 32 05 23**  
**CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section shall cover site work concrete constructed upon the prepared subgrade and in conformance with the lines, grades, thickness, and cross sections shown. Construction shall include the following:
1. Pedestrian Pavement: Walks, crossings, wheelchair curb ramps, steps.

**1.2 RELATED WORK**

- A. Laboratory and Field Testing Requirements: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Subgrade Preparation: Section 31 20 00, EARTH MOVING.
- C. Concrete Materials, Quality, Mixing, Design and Other Requirements: Section 03 30 50, (SHORT FORM) CAST-IN-PLACE-CONCRETE.
- D. Metal Components of Steps (Nosing): Section 05 50 00, METAL FABRICATIONS.
- E. Railing Components of Steps: Section 05 73 23, ORNAMENTAL RAILINGS.

**1.3 DESIGN REQUIREMENTS**

- A. Design all elements with the latest published version of applicable codes.

**1.4 WEATHER LIMITATIONS**

- A. Placement of concrete shall be as specified under Section 03 30 00, CAST-IN-PLACE CONCRETE.

**1.5 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Manufacturers' Certificates and Data certifying that the following materials conform to the requirements specified.
1. Expansion joint filler
  2. Reinforcement
  3. Curing materials

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

Concrete shall be Type C, air-entrained as specified in Section 03 30 50, (SHORT FORM) CAST-IN-PLACE CONCRETE, with the following exceptions:

<u>TYPE</u>	<u>MAXIMUM SLUMP*</u>
Pedestrian Pavement	75 mm (3")
* For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94.	

### **2.2 REINFORCEMENT**

- A. The type, amount, and locations of steel reinforcement shall be as shown on the drawings and in the specifications.
- B. Welded wire-fabric shall conform to AASHTO M55.
- C. Dowels shall be plain steel bars conforming to AASHTO M31. Tie bars shall be deformed steel bars conforming to AASHTO M31.

### **2.3 FORMS**

- A. Use metal or wood forms that are straight and suitable in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete, for the work involved.
- B. Do not use forms if they vary from a straight line more than 3 mm (1/8 inch) in any 3000 mm (ten foot) long section, in either a horizontal or vertical direction.
- C. Wood forms should be at least 50 mm (2 inches) thick (nominal). Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for forming radii.

### **2.4 CONCRETE CURING MATERIALS**

- A. Concrete curing materials shall conform to one of the following:
  - 1. Burlap conforming to AASHTO M182 having a weight of 233 grams (seven ounces) or more per square meter (yard) when dry.
  - 2. Impervious Sheeting conforming to AASHTO M171.
  - 3. Liquid Membrane Curing Compound conforming to AASHTO M148 (ASTM C309), Type 1 (clear), and shall be free of paraffin or petroleum.

### **2.5 EXPANSION JOINT FILLERS**

Material shall conform to AASHTO M213.

## **PART 3 - EXECUTION**

### **3.1 SUBGRADE PENETRATION**

- A. Prepare, construct, and finish the subgrade as specified in Section 31 20 00, EARTH MOVING.
- B. Maintain the subgrade in a smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

### **3.2 SETTING FORMS**

- A. Base Support:
  - 1. Compact the base material under the forms true to grade so that, when set, they will be uniformly supported for their entire length at the grade as shown.
  - 2. Correct imperfections or variations in the base material grade by cutting or filling and compacting.
- B. Form Setting:
  - 1. Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines.
  - 2. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction.
  - 3. Forms shall conform to line and grade with an allowable tolerance of 3 mm (1/8 inch) when checked with a straightedge and shall not deviate from true line by more than 6 mm (1/4 inch) at any point.
  - 4. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing.
  - 5. Clean and oil forms each time they are used.
- C. Provide inserts for stair nosing as specified in Section 05 50 00 METAL FABRICATIONS.

### **3.3 EQUIPMENT**

- A. The Resident Engineer shall approve equipment and tools necessary for handling materials and performing all parts of the work prior to commencement of work.
- B. Maintain equipment and tools in satisfactory working condition at all times.



### **3.4 PLACING REINFORCEMENT**

- A. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the reinforcement.
- B. Before the concrete is placed, the Resident Engineer shall approve the reinforcement, which shall be accurately and securely fastened in place with suitable supports and ties. The type, amount, and position of the reinforcement shall be as shown.

### **3.5 PLACING CONCRETE - GENERAL**

- A. Obtain approval of the Resident Engineer before placing concrete.
- B. Remove debris and other foreign material from between the forms before placing concrete. Obtain approval of the Resident Engineer before placing concrete.
- C. Before the concrete is placed, uniformly moisten the subgrade, base, or subbase appropriately, avoiding puddles of water.
- D. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.
- E. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Vibrate concrete well against forms and along joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads.
- F. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work.
- G. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.

### **3.6 PLACING CONCRETE FOR PEDESTRIAN PAVEMENT**

- A. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform to the cross section as shown.
- B. Deposit concrete as near to joints as possible without disturbing them but do not dump onto a joint assembly.
- C. After the concrete has been placed in the forms, use a strike-off guided by the side forms to bring the surface to the proper section to be compacted.

- D. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment.
- E. Finish the surface to grade with a wood or metal float.
- F. All concrete pavements shall be constructed with sufficient slope to drain properly.

### **3.7 CONCRETE FINISHING - GENERAL**

- A. The sequence of operations, unless otherwise indicated, shall be as follows:
  - 1. Consolidating, floating, straight-edging, troweling, texturing, and edging of joints.
  - 2. Maintain finishing equipment and tools in a clean and approved condition.

### **3.8 CONCRETE FINISHING PEDESTRIAN PAVEMENT**

- A. Walks, Wheelchair Curb Ramps:
  - 1. Finish the surfaces to grade and cross section with a metal float, trowled smooth and finished with a broom moistened with clear water.
  - 2. Brooming shall be transverse to the line of traffic.
  - 3. Finish all slab edges, including those at formed joints, carefully with an edger having a radius as shown on the Drawings.
  - 4. Unless otherwise indicated, edge the transverse joints before brooming. The brooming shall eliminate the flat surface left by the surface face of the edger. Execute the brooming so that the corrugation, thus produced, will be uniform in appearance and not more than 2 mm (1/16 inch) in depth.
  - 5. The completed surface shall be uniform in color and free of surface blemishes, form marks, and tool marks. The finished surface of the pavement shall not vary more than 5 mm (3/16 inch) when tested with a 3000 mm (10 foot) straightedge.
  - 6. The thickness of the pavement shall not vary more than 6 mm (1/4 inch).
  - 7. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints.
- B. Steps: The method of finishing the steps and the sidewalls is similar to above except as herein noted.
  - 1. Remove the riser forms one at a time, starting with the top riser.
  - 2. After removing the riser form, rub the face of the riser with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Use an outside edger to round the

- corner of the tread; use an inside edger to finish the corner at the bottom of the riser.
3. Give the risers and sidewall a final brush finish. The treads shall have a final finish with a stiff brush to provide a non-slip surface.
  4. The texture of the completed steps shall present a neat and uniform appearance and shall not deviate from a straightedge test more than 5 mm (3/16 inch).

### **3.9 JOINTS - GENERAL**

- A. Place joints, where shown, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface.
- B. Joints shall be straight and continuous from edge to edge of the pavement.

### **3.10 CONTRACTION JOINTS**

- A. Cut joints to depth as shown with a grooving tool or jointer of a radius as shown or by sawing with a blade producing the required width and depth.
- B. Finish edges of all joints with an edging tool having the radius as shown.
- C. Score pedestrian pavement with a standard grooving tool or jointer.

### **3.11 EXPANSION JOINTS**

- A. Use a preformed expansion joint filler material of the thickness as shown to form expansion joints.
- B. Material shall extend the full depth of concrete, cut and shaped to the cross section as shown, except that top edges of joint filler shall be below the finished concrete surface where shown to allow for sealing.
- C. Anchor with approved devices to prevent displacing during placing and finishing operations.
- D. Round the edges of joints with an edging tool.
- E. Form expansion joints as follows:
  1. Without dowels, about structures and features that project through, into, or against any site work concrete construction.
  2. Using joint filler of the type, thickness, and width as shown.
  3. Installed in such a manner as to form a complete, uniform separation between the structure and the site work concrete item.

### **3.12 CONSTRUCTION JOINTS**

- A. Place transverse construction joints of the type shown, where indicated and whenever the placing of concrete is suspended for more than 30 minutes.

### **3.13 FORM REMOVAL**

- A. Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring the concrete.
- B. Do not use bars or heavy tools against the concrete in removing the forms. Promptly repair any concrete found defective after form removal.

### **3.14 CURING OF CONCRETE**

- A. Cure concrete by one of the following methods appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready to install before actual concrete placement begins. Provide protection as necessary to prevent cracking of the pavement due to temperature changes during the curing period. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove and replace the damaged pavement and employ another method of curing as directed by the Resident Engineer.
- B. Burlap Mat: Provide a minimum of two layers kept saturated with water for the curing period. Mats shall overlap each other at least 150 mm (6 inches).
- C. Impervious Sheeting: Use waterproof paper, polyethylene-coated burlap, or polyethylene sheeting. Polyethylene shall be at least 0.1 mm (4 mils) in thickness. Wet the entire exposed concrete surface with a fine spray of water and then cover with the sheeting material. Sheets shall overlap each other at least 300 mm (12 inches). Securely anchor sheeting.
- D. Liquid Membrane Curing:
  - 1. Apply pigmented membrane-forming curing compound in two coats at right angles to each other at a rate of 5 m<sup>2</sup>/L (200 square feet per gallon) for both coats.
  - 2. Do not allow the concrete to dry before the application of the membrane.

3. Cure joints designated to be sealed by inserting moistened paper or fiber rope or covering with waterproof paper prior to application of the curing compound, in a manner to prevent the curing compound entering the joint.
4. Immediately re-spray any area covered with curing compound and damaged during the curing period.

### **3.15 CLEANING**

- A. After completion of the curing period:
  1. Remove the curing material (other than liquid membrane).
  2. Sweep the concrete clean.
  3. After removal of all foreign matter from the joints, seal joints as herein specified.
  4. Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.

### **3.16 PROTECTION**

The contractor shall protect the concrete against all damage prior to final acceptance by the Government. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the entire section between regularly scheduled joints, when directed by the Resident Engineer, and at no additional cost to the Government. Exclude traffic from vehicular pavement until the concrete is at least seven days old, or for a longer period of time if so directed by the Resident Engineer.

### **3.17 FINAL CLEAN-UP**

Remove all debris, rubbish and excess material from the Station.

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**SECTION 32 12 16**  
**ASPHALT PAVING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This work shall cover the composition, mixing, construction upon the prepared subgrade, and the protection of hot asphalt concrete pavement. The hot asphalt concrete pavement shall consist of an aggregate or asphalt base course and asphalt surface course constructed in conformity with the lines, grades, thickness, and cross sections as shown. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.

**1.2 RELATED WORK**

- A. Subgrade Preparation: Paragraph 3.3 and Section 31 20 00, EARTH MOVING.
- B. Pavement Markings: Section 32 17 23, PAVEMENT MARKINGS.

**1.3 QUALITY ASSURANCE**

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the state or of authorities having jurisdiction.
  - 1. Standard Specification: Standard Specification for road and bridge construction of Mississippi Department of Transportation, Current Edition.

**1.4 ALIGNMENT AND GRADE CONTROL**

The Contractor's Registered Professional Land Surveyor shall establish and control the pavement (aggregate or asphalt base course and asphalt surface course) alignments, grades, elevations, and cross sections as shown on the Drawings.

**1.5 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Data and Test Reports:
  - 1. Job-mix formula.
- C. Certifications:
  - 1. Asphalt prime and tack coat material certificate of conformance to State Highway Department requirements.

- 2. Asphalt cement certificate of conformance to State Highway Department requirements.
- D. One copy of State Highway Department Specifications.
- E. Provide MSDS (Material Safety Data Sheets) for all chemicals used on ground.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Where the term "Engineer" or "Commission" is referenced in the State Highway Specifications, it shall mean the VA Resident Engineer or VA Contracting Officer.

### **2.2 MATERIALS**

- A. Course Aggregate: Sound; angular crushed limestone; properly recycled crushed concrete; or properly cured, crushed blast-furnace slag; complying with ASTM D 1557.
- B. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone or combinations thereof; complying with ASTM D 698.
- C. Asphalt Cement: ASTM D 3381 for viscosity-graded material.
- D. Undersealing Asphalt: ASTM D 3141, pumping consistency.
- E. Prime Coat: Asphalt emulsion prime conforming to Mississippi DOT requirements.
- F. Water: Potable.

### **2.3 SEALER**

- A. Provide a sealer consisting of suitable fibrated chemical type asphalt base binders and fillers having a container consistency suitable for troweling after thorough stirring, and containing no clay or other deleterious substance.
- B. Where conflicts arise between this specification and the requirements in the latest version of the State Highway Specifications, the State Specifications shall control.

### **2.4 MIXES**

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and designed according to procedures in the MDOT Standard Specification (MSS) for Road and Bridge Construction.

1. Bituminous materials shall be composed of mineral aggregates, filler, or other material, if required, and bituminous material, mixed in a central plant, conforming to subsection 403.02 of MSS. The job mix formula shall meet the requirements of MSS Type HMA, Mixture 4.75 mm.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

The Asphalt Concrete Paving equipment, weather limitations, job-mix formula, mixing, construction methods, compaction, finishing, tolerance, and protection shall conform to the requirements of the appropriate sections of the State Highway Specifications for the type of material specified.

#### **3.2 MIXING ASPHALTIC CONCRETE MATERIALS**

- A. Provide hot plant-mixed asphaltic concrete paving materials.
  1. Temperature leaving the plant: 143 degrees C(290 degrees F) minimum, 160 degrees C(320 degrees F) maximum.
  2. Temperature at time of placing: 138 degrees C(280 degrees F) minimum.

#### **3.3 SUBGRADE**

- A. Shape to line and grade and compact with self-propelled rollers.
- B. All depressions that develop under rolling shall be filled with acceptable material and the area re-rolled.
- C. Soft areas shall be removed and filled with acceptable materials and the area re-rolled.
- D. Should the subgrade become rutted or displaced prior to the placing of the subbase, it shall be reworked to bring to line and grade.
- E. Proof-roll the subgrade with maximum 45 tonne (50 ton) gross weight dump truck as directed by VA Resident Engineer or VA Contracting Officer. If pumping, pushing, or other movement is observed, rework the area to provide a stable and compacted subgrade.

#### **3.4 BASE COURSES**

- A. Base
  1. Spread and compact to the thickness shown on the drawings.
  2. Rolling shall begin at the sides and continue toward the center and shall continue until there is no movement ahead of the roller.



3. After completion of the base rolling there shall be no hauling over the base other than the delivery of material for the top course.
- B. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 0.0mm (0.0") to plus 12.7mm (0.5").
- C. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 5mm in 3m (3/16 inch in ten feet).
- D. Moisture content: Use only the amount of moisture needed to achieve the specified compaction.

### **3.5 PLACEMENT OF ASPHALTIC CONCRETE PAVING**

- A. Remove all loose materials from the compacted base.
- B. Apply the specified prime coat, and tack coat, and allow to dry in accordance with the manufacturer's recommendations as approved by the Architect or Engineer.
- C. Receipt of asphaltic concrete materials:
  1. Do not accept material unless it is covered with a tarpaulin until unloaded, and unless the material has a temperature of not less than 130 degrees C (280 degrees F).
  2. Do not commence placement of asphaltic concrete materials when the atmospheric temperature is below 10 degrees C (50 degrees F), not during fog, rain, or other unsuitable conditions.
- D. Spreading:
  1. Spread material in a manner that requires the least handling.
  2. Where thickness of finished paving will be 76mm (3") or less, spread in one layer.
- E. Rolling:
  1. After the material has been spread to the proper depth, roll until the surface is hard, smooth, unyielding, and true to the thickness and elevations shown on the drawings.
  2. Roll in at least two directions until no roller marks are visible.
  3. Finished paving smoothness tolerance:
    - a. No depressions which will retain standing water.
    - b. No deviation greater than 3mm in 1.8m (1/8" in six feet).

### **3.6 APPLICATION OF SEAL COAT**

- A. Prepare the surfaces, mix the seal coat material, and apply in accordance with the manufacturer's recommendations as approved by the Architect or Engineer.
- B. Apply one coat of the specified sealer.

- C. Achieve a finished surface seal which, when dry and thoroughly set, is smooth, tough, resilient, of uniform black color, and free from coarse textured areas, lap marks, ridges, and other surface irregularities.

### **3.7 PROTECTION**

Protect the asphaltic concrete paved areas from traffic until the sealer is set and cured and does not pick up under foot or wheeled traffic.

### **3.8 FINAL CLEAN-UP**

Remove all debris, rubbish, and excess material from the work area.

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**SECTION 32 17 23**  
**PAVEMENT MARKINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This work shall consist of furnishing and applying paint and reflective glass beads on pavement surfaces, in the form of traffic lanes, parking bays, areas restricted to handicapped persons, crosswalks, and other detail pavement markings, in accordance with the details as shown or as prescribed by the Resident Engineer. Conform to the Manual on Uniform Traffic Control Devices for Streets and Highways, published by the U.S. Department of Transportation, Federal Highway Administration, for details not shown.

**1.2 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish Manufacturer's Certificates and Data certifying that the following materials conform to the requirements specified.
- B. Paint.
- C. Reflective Glass Beads

**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. Federal Specifications (Fed. Spec.):
  - TT-B-1325C.....Beads (Glass Spheres); Retro-Reflective
  - TT-P-1952D.....Paint, Traffic Black, and Airfield Marking,  
Waterborne
- C. Master Painters Institute (MPI):
  - Approved Product List - 2010

**PART 2 - PRODUCTS**

**2.1 PAINT**

Paint for marking pavement (parking lot and zone marking) shall conform to MPI No. 97, color as shown. Paint for obliterating existing markings shall conform to Fed. Spec. TT-P-1952D. Paint shall be in containers of

at least 18 L (5 gallons). A certificate shall accompany each batch of paint stating compliance with the applicable publication.

## **2.2 REFLECTIVE GLASS BEADS**

Beads shall conform to Fed. Spec. TT-B-1325C, Type I, Gradation A. When used in regions of high humidity, coat beads with silicone or other suitable waterproofing material to assure free flow. Furnish the glass beads in containers suitable for handling and strong enough to prevent loss during shipment. A certificate shall accompany each batch of beads stating compliance with this section.

## **2.3 PAINT APPLICATOR**

Apply all marking by approved mechanical equipment. The equipment shall provide constant agitation of paint and travel at controlled speeds. Synchronize one or more paint "guns" to automatically begin and cut off paint flow in the case of skip lines. The equipment shall have manual control to apply continuous lines of varying length and marking widths as shown. Provide pneumatic spray guns for hand application of paint in areas where a mobile paint applicator cannot be used. If the equipment does not have a glass bead dispenser, use a separate piece of equipment.

Adjust and synchronize the equipment with the paint applicator so that the reflective beads are distributed uniformly on the paint lines within ten seconds without any waste. An experienced technician that is thoroughly familiar with equipment, materials, and marking layouts shall control all painting equipment and operations.

## **2.4 SANDBLASTING EQUIPMENT**

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall furnish not less than 0.08 m<sup>3</sup>/s (150 cfm) of air at a pressure of not less than 625 kPa (90 psi) at each nozzle used.

# **PART 3 - EXECUTION**

## **3.1 SURFACE PREPARATION**

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.
- B. Thoroughly clean all surfaces to be marked before application of paint. Remove dust, dirt, and other granular surface deposits by sweeping,

blowing with compressed air, rinsing with water, or a combination of these methods. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement with scrapers, wire brushings, sandblasting, mechanical abrasion, or approved chemicals as directed by the Resident Engineer. The application of paint conforming to Fed. Spec. TT-P-1952D is an option to removal of existing paint markings on asphalt pavement. Apply the black paint in as many coats as necessary to completely obliterate the existing markings. Where oil or grease are present on old pavements to be marked, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application. After cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint. Pavement marking shall follow as closely as practicable after the surface has been cleaned and dried, but do not begin any marking until the Resident Engineer has inspected the surface and gives permission to proceed. The Contractor shall establish control points for marking and provide templates to control paint application by type and color at necessary intervals. The Contractor is responsible to preserve and apply marking in conformance with the established control points.

### **3.2 APPLICATION**

Apply uniformly painted and reflective pavement marking of required color(s), length, and width with true, sharp edges and ends on properly cured, prepared, and dried surfaces in conformance with the details as shown and established control points. The length and width of lines shall conform within a tolerance of plus or minus 75 mm (3 inches) and plus or minus 3 mm (1/8 inch), respectively, in the case of skip markings. The length of intervals shall not exceed the line length tolerance. Temperature of the surface to be painted and the atmosphere shall be above 10°C (50°F) and less than 35°C (95°F). Apply the paint at a wet film thickness of 0.4 mm (0.015 inch). Disperse reflective glass beads evenly on the wet paint at a rate of 720 g/L (6 pounds per gallon) of paint. Apply paint in one coat. At the direction of the Resident Engineer, markings showing light spots may receive additional coats. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of asphalt, and pick-up, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the marking, discontinue paint operations until cause of the slow drying is determined and corrected. Remove and replace

marking that is applied at less than minimum material rates; deviates from true alignment; exceeds stipulated length and width tolerances; or shows light spots, faulty distribution of beads, smears, or other deficiencies or irregularities. Use carefully controlled sand blasting, approved grinding equipment, or other approved method to remove marking so that the surface to which the marking was applied will not be damaged.

### **3.3 PROTECTION**

Conduct operations in such a manner that necessary traffic can move without hindrance. Protect the newly painted markings so that, insofar as possible, the tires of passing vehicles will not pick up paint. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic. Efface and replace damaged portions of markings at no additional cost to the Government.

### **3.4 DETAIL PAVEMENT MARKING**

Use Detail Pavement Markings, exclusive of actual traffic lane marking, at exit and entrance islands and turnouts, on curbs, at crosswalks, at parking bays, and at such other locations as shown. Show the International Handicapped Symbol at indicated parking spaces. Color shall be as shown. Apply paint for the symbol using a suitable template that will provide a pavement marking with true, sharp edges and ends. Place detail pavement markings of the color(s), width(s) and length(s), and design pattern at the locations shown.

### **3.5 FINAL CLEAN-UP**

Remove all debris, rubbish and excess material from the Station.

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